THE

GARDENS' BULLETIN

SINGAPORE

Vol. XII 30th April, 1949 Part 1

CONTENTS

	PAGE
The Genus Eugenia (Myrtaceae) in Malaya *by M. R. Henderson*	1

To be purchased at the Botanic Gardens, Singapore.
Price $10 or 25s.

Published by Authority

PRINTED AT THE GOVERNMENT PRINTING OFFICE, SINGAPORE,
BY V. C. G. GATRELL, GOVERNMENT PRINTER.

1949

THE

GARDENS' BULLETIN

SINGAPORE

Vol. XII 30th April, 1949 Part 1

THE GENUS EUGENIA (MYRTACEAE) IN MALAYA

by

M. R. HENDERSON, F.L.S.

Eugenia Linn. in its widest sense is a very large genus spread over the tropics and subtropics of the New World and the tropics of Asia, Africa and Australia, with one species reaching as far as New Zealand, the bulk of the Old World species being in Asia.

As Merrill and Perry point out, the genus, with some 2,500 binomials, has become unwieldy, but attempts to split it up into more easily handled groups have not met with conspicuous success, for the limits of such groups are very difficult to define. The Asiatic species have been considered to fall into two genera, *Syzygium* Gaertn. and *Jambosa* DC., but although the extremes of these groups are distinct enough, they merge into one another in such a way that no clear dividing line can be found.

The most recent work on Malaysian *Eugenia* is that of Merrill and Perry on the Bornean species (Mem. Amer. Acad. Arts and Sci., XVIII, part 3) and here and in earlier papers (Journ. Arn. Arb., XVIII, XIX) they give their reasons for maintaining *Syzygium* for the majority of the Asiatic species with *Acmena* DC. and *Cleistocalyx* Bl. as separate genera, *Acmena* characterised by fruit and anther characters, *Cleistocalyx* by its calyptrate calyces.

Their arguments for separating *Syzygium* from *Eu-eugenia* are based mainly on the structure of the seed. *Syzygium*, they say, has the cotyledons separate and distinct while in *Eu-eugenia* they have grown together and are mechanically inseparable. The second point is that the testa in *Syzygium* is adherent to the pericarp while in *Eu-eugenia* it is free from it and adherent to the cotyledons.

I propose to examine the second of these statements, the less important of the two, first.

Merrill and Perry are careful to imply that their conclusions were drawn from dried material. I have examined dried fruit of many Malayan species and find that in a number of cases the testa does strip with the pericarp and leave the naked cotyledons, but in other cases it does not. In some of the large fruits of the "Jambosa" group, for example, the seeds lie loosely within the pericarp and the rather thick testa remains closely adherent to the cotyledons. Even in *Syzygium* proper the removal of the pericarp of the dried fruit does not always entail the removal of the testa. In boiled up fruits and fruits preserved in alcohol it seems to be a matter of the methods of handling the specimen whether the testa strips with the pericarp or not. If there are any characters here on which generic distinctions can be based, they should be apparent in living material and I have therefore examined fresh fruit of as many species as possible. I find that in the majority of local species the seed coat remains on the cotyledons when the pericarp is removed. I have not been able to examine fresh fruit of many species of *Eu-eugenia,* but so far as I have gone, the two groups are alike in this respect.

The degree of adherence of the seed coat to the cotyledons varies greatly within the section *Syzygium.* In such species as *E. javanica, E. malaccensis, E. aquea,* etc., where the seed or seeds lie loosely within a cavity in the thick pericarp, the testa is a thick pithy layer removable only with difficulty from the rugose surface of the cotyledons. Other species, such as *E. grandis* and *E. subdecussata,* have a comparatively thick pithy seed coat adherent to the smooth surfaced cotyledons. Innumerable seeds of the former may be picked up in the Botanic Gardens Singapore at appropriate seasons of the year, every one with the pericarp completely removed by bats, but with the testa intact. I have watched a *berok* monkey (*Macacus nemestrina*) nibbling the fruits of *E. subdecussata.* Here again the slightly sweet pericarp is neatly removed and the seed thrown away with undamaged testa. Some species have a somewhat brittle seed coat which can be removed only in small pieces, while others have a thin, more or less membranous covering which is easily slipped off, very like that of *E. uniflora* L. or *E. apiculata* DC., both New World species. Germinating seeds of *Syzygium,* found on the ground under the parent tree, usually have the testa more or less intact, the pericarp having rotted away.

It seems apparent therefore that the seed coat and its degree of adherence to the cotyledons can hardly be used as a basis for generic distinctions.

The pseudomonocotyledonous nature of the seed of *Eu-eugenia* appears to be a character of great value, but unfortunately it does not hold throughout the group. It appears that all gradations from completely fused to completely free cotyledons are to be found in *Eu-eugenia*. *E. Michelii* Lam. may have a seed consisting of a single mass of tissue, the cotyledons not separating on germination, or the opposing cotyledon faces may be fused together only partially. *E. apiculata* DC. and *E. myrtifolia* (non Roxb.). both New World species, have completely free cotyledons and the seed structure in these species is not essentially different from that of a typical *Syzygium*. In *E. bracteata* Roxb., an E. Indian species placed in *Eu-eugenia,* the cotyledons are fused from one quarter to one third of the area of their opposing faces, while in *E. Muelleri,* a local species of the section *Syzygium,* seeds have been found with a small area of the opposing faces fused. At least one local species of *Syzygium* has the cotyledons fused into a single mass and another has them so locked together that it is doubtful if they can be separated without fracturing the tissues. In neither of these species do the cotyledons separate on germination.

It appears therefore that the pseudomonocotyledonous nature of the seed can not be regarded as a good generic character. In some cases it cannot be regarded even as a specific character. A similar state of affairs has been pointed out in Cupuliferae by A. Camus—"Soudure des Cotylédons dans le genre Lithocarpus Blume" in Bulletin Muséum National d'Histoire Naturelle, XIV, vi, 461 (1942). Here the fusion of the cotyledons in *Lithocarpus* is frequent, but it is a specific character and does not occur throughout any of the subgenera.

The fruits of *Syzygium* are usually one-seeded, with equal or nearly equal cotyledons which are often green and conspicuously gland dotted, lying side by side, superposed, or, more rarely, obliquely. The opposing faces may be plane, somewhat concave, or folded and interlocked, depending on the method of attachment of the cotyledons to the hypocotyle. The hypocotyle is usually short, the plumule and radicle small, lying near the centre of the inner faces, or sometimes near the periphery. Polyembryony occurs in some species.

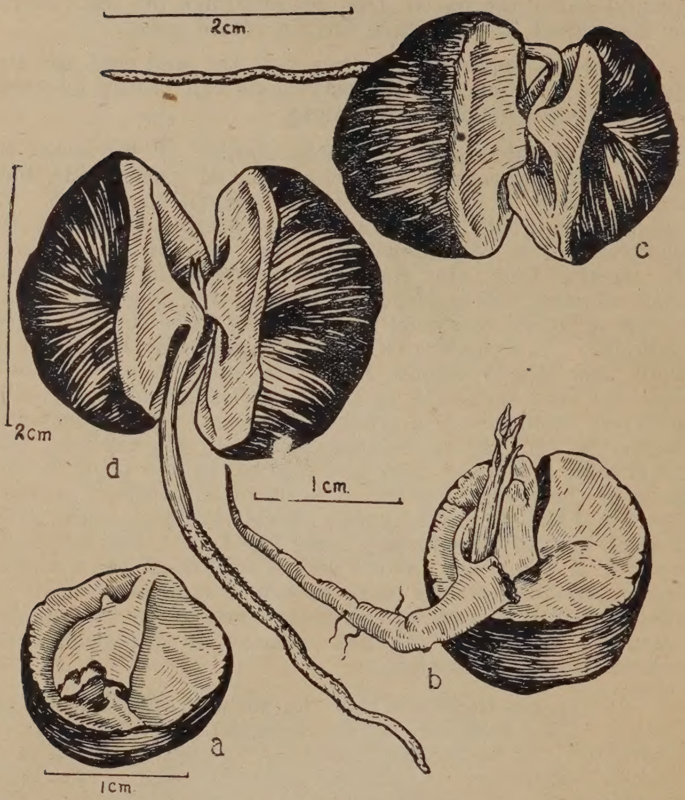

Fig. 1. a, b, cotyledons of *E. malaccensis* from a germinating seed; c, d, germinating seeds of *E. javanica*. The broad stalks of the cotyledons are clearly seen.
Del: CHAN YORK CHYE.

In the large fruited "Jambosa" group, *E. malaccensis* for example, the cotyledons are attached to the hypocotyle by stalks which consist of broad, flattened, triangular bands of tissue, arising from the inner faces of the cotyledons, parallel with them for the greater part of their length, then curving at right angles to meet the hypocotyle. The excavations in the cotyledon faces to accommodate these stalks make the structure apparently very complicated, but it becomes perfectly clear when the seeds germinate and the cotyledons begin to move apart. (Fig. 1).

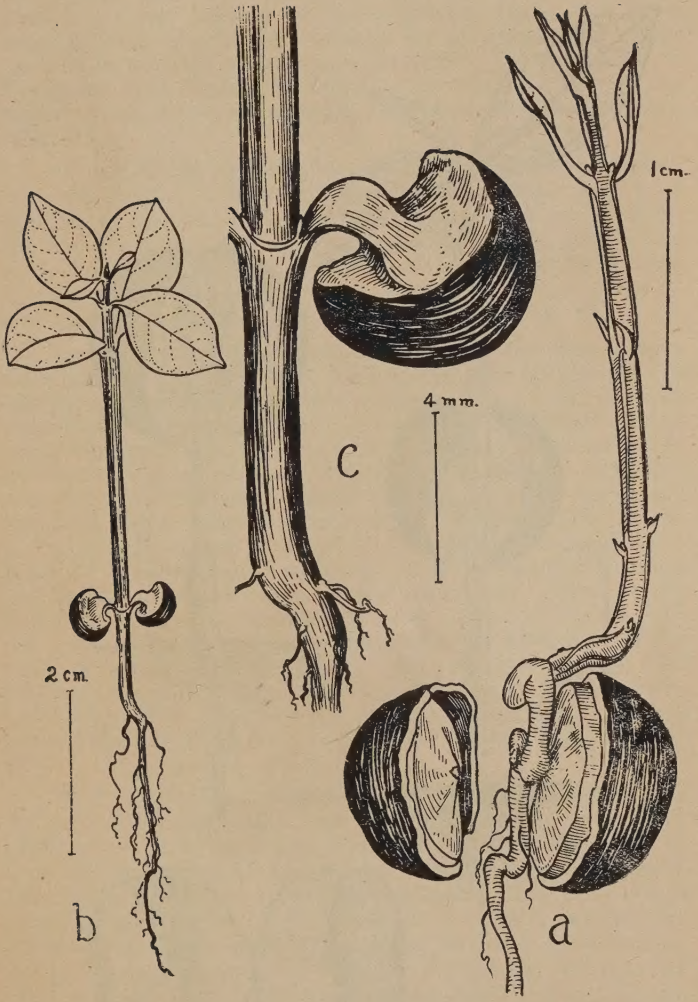

Fig. 2. a, germinating seed of *E. Ngadimaniana*, showing sessile cotyledons, thick persistent testa, and angled shoot; b, c, *E. conglomerata*, seedling showing stalked cotyledons and epigeal germination.

Del: Chan York Chye.

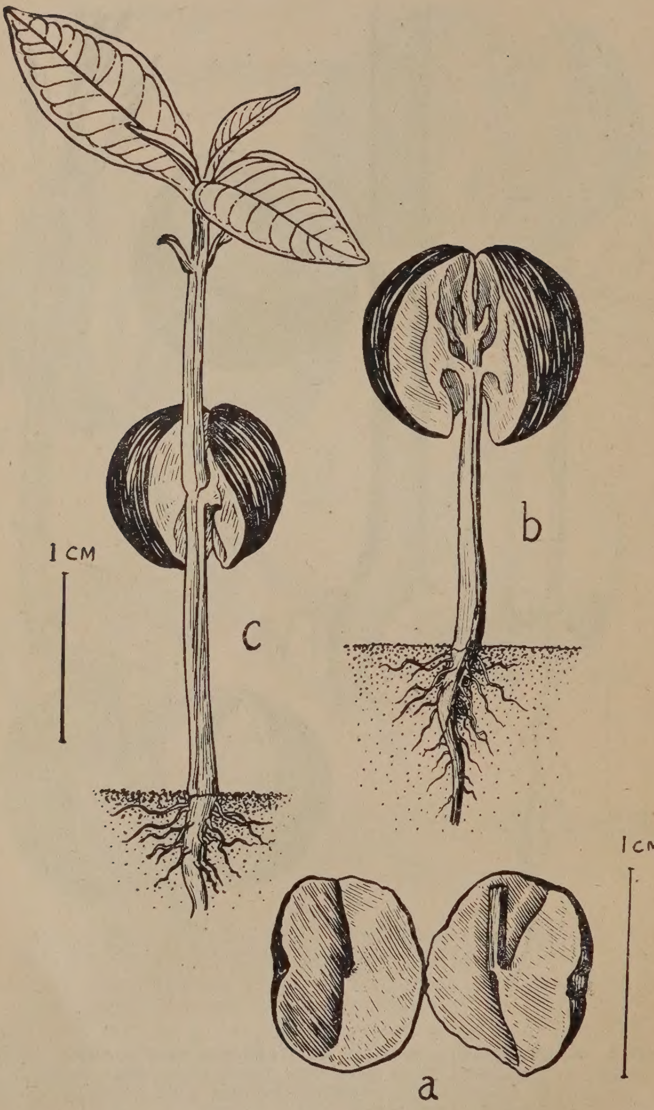

Fig. 3. *E. pustulata,* a, cotyledons showing conspicuous hypocotyle; b, c, seedling showing epigeal germination.

Del: Chan York Chye.

The same type of structure in a less complicated form is met with in many of the smaller flowered species. Here the stalks are much shorter and there is much less excavation and folding of the cotyledon faces, the faces usually being nearly plane except for an excavation under each stalk and the radicle and plumule. Other species of *Syzygium* have "sessile" cotyledons attached directly to the hypocotyle and leaving a small circular scar when detached. (Fig. 2).

Normally the hypocotyle, plumule and radicle are small and completely hidden between the cotyledons, but in a number of species the hypocotyle is elongated and reaches the surface of the seed and is accommodated in a deep fold in the cotyledon faces. The Clove (*E. aromatica*), *E. cerina*, *E. polyantha*, *E. conglomerata*, *E. attenuata*, are some of the species which have this type of seed. (Fig. 3).

In a few local species the structure of the seed is very different. In *E. claviflora*, for instance, the cotyledons are closely adherent. There is a definite line or commissure visible on the outside of the seed, but the cotyledons can be separated only by force, and although they do not appear to be fused together, they are closely interlocked by irregular rounded projections and depressions on the inner faces, and separating them usually entails some fracture of the tissues. A large part of the interior of the seed is occupied by a mass of brown tissue ramifying in all directions through the lighter coloured tissue of the cotyledons. This brown mass appears, on sectioning the seed, to be continuous with the testa. The radicle and plumule are not visible when the seed is broken or cut open, and on germination the cotyledons do not move apart but remain as a solid mass until long after the seedling is well established. In this respect the germination is very similar to that of *E. Michelii* Lam. (Fig. 4).

In *E. flosculifera*, a species known from Singapore and perhaps from Kemaman, the seed structure is even more peculiar. The fruit is like a miniature "Jambosa" fruit in that the pericarp is comparatively thick and the seed small. Ripe seeds appear to have the cotyledons completely fused together and no line of demarcation is visible, nor can the cotyledons be separated. The young seed is a green hollow ball with no indication of separate cotyledons, the interior face of the hollow with irregular rounded knobs and the hollow filled with a colourless gummy substance. The completely ripe seed is a mass of dark brown tissue with an irregularly shaped hollow of approximately one quarter of its volume, communicating with the exterior of the seed.

The radicle and plumule are not visible. On germination the cotyledons do not separate. The structure appears similar to that of *E. claviflora*, but carried further towards complete fusion of the cotyledons.

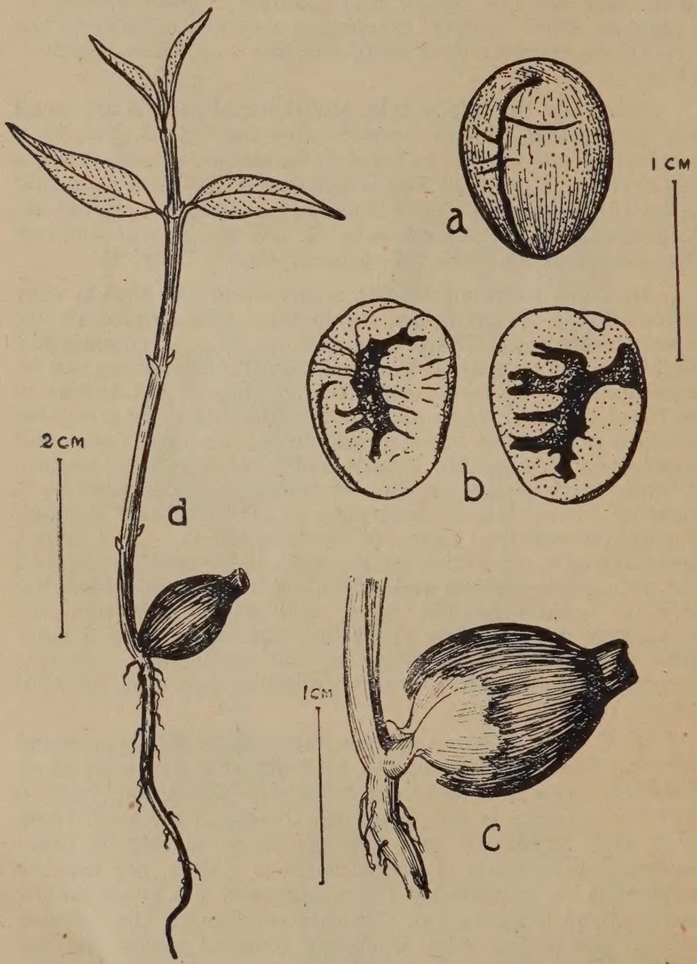

Fig. 4. *E. claviflora*, a, seed; b, separated cotyledons; c, d, seedling showing the cotyledons still unseparated although the seedling is well grown.

Del: CHAN YORK CHYE.

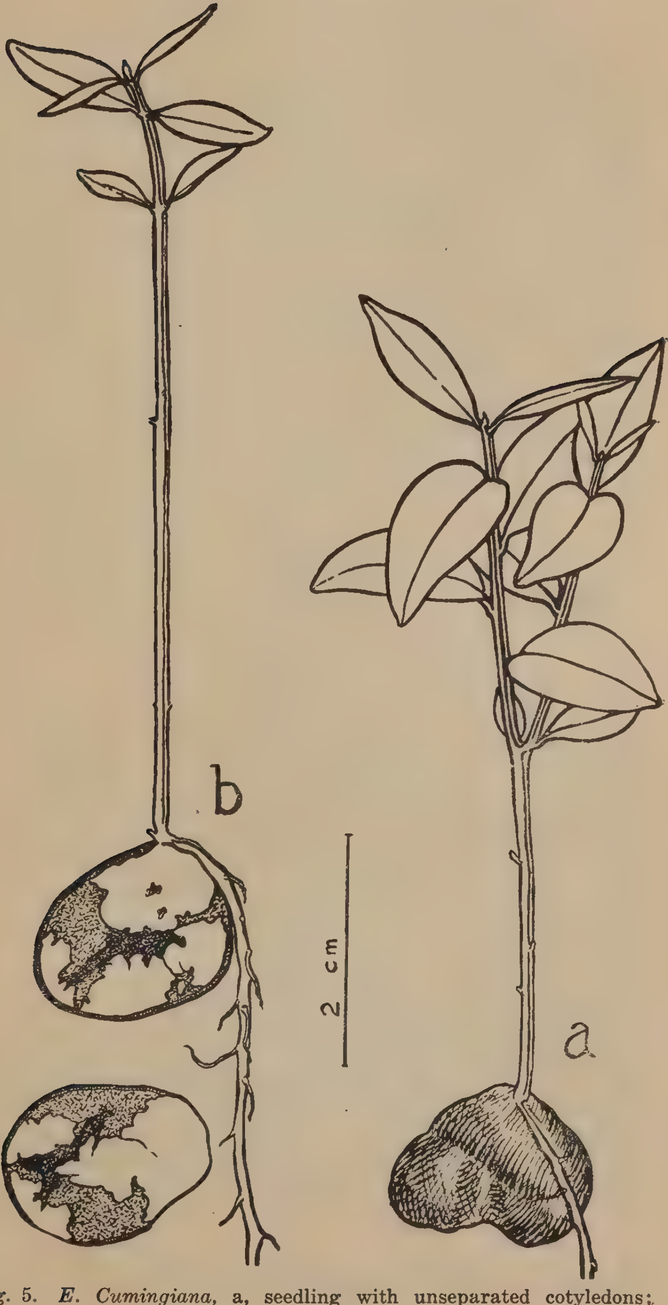

Fig. 5. *E. Cumingiana*, a, seedling with unseparated cotyledons; b, seedling with seed cut open.
Del: CHAN YORK CHYE.

Merrill and Perry (Journ. Arn. Arb., XIX, 12 (1938)) reinstate *Acmena* DC. for a small number of species characterised by the pseudomonocotyledonous nature of the seed and the divaricate anther sacs opening by terminal slits or pores. *Eugenia Cumingiana* Vidal (*Acmena acuminatissima* (Bl.) Merr. and Perry) is the only representative of this section in the Malay Peninsula. Fresh seed of this species shows a structure very similar to that of *E. claviflora*. The cotyledons appear to be completely fused and no line of demarcation is visible. The interior of the seed is occupied by a ramifying mass of brown tissue which appears to be continuous with the testa, and there is no separation of the cotyledons on germination. (Fig. 5).

The other generic segregate reinstated by Merrill and Perry and occurring in the Peninsula is *Cleistocalyx* Bl. This is characterised by the calyptrate nature of the calyx. Our only representative is *E. operculata* Roxb., which has a seed structure similar to that in those species of *Syzygium* in which the hypocotyle is elongated to reach the periphery of the seed.

A new section, *Fissicalyx*, has had to be erected for two closely related species in which the flower structure departs very markedly from that normal in *Syzygium*, or even in *Eugenia* sens. lat. In *Fissicalyx* the calyx tube is prolonged far above the margin of the disc, and the stamens are scattered over its inner surface. The fruit appears to be of the normal *Syzygium* type.

It seems very improbable, therefore, that a satisfactory basis for splitting *Eugenia* is to be found in seed characters. On such a basis not only would further groups have to be segregated from *Syzygium*, as defined by Merrill and Perry, but *Eu-eugenia* itself would have to be split. The problem is a difficult one and probably can be solved only by someone who can undertake the enormous task of monographing the entire genus. Either *Eugenia* must be kept in its widest sense, which might necessitate inclusion of such closely related genera as *Aphanomyrtus*, and then it becomes more unwieldy than ever, or numerous small genera must be segregated from it. If the Old and New World species are to be separated, better characters might be found in the structure of the inflorescences and flowers.

A further complication is that, as Merrill and Perry point out in Mem. Amer. Acad. Arts and Sci., XVIII, 135, *Syzygium* is not the oldest available name for the group they have placed under that name. *Caryophyllus* Linn. (1754) is older, but Merrill and Perry use *Syzygium* Gaertn. (1788) because it is better known and because fewer name changes are involved. They recommend *Syzygium* for conservation against *Caryophyllus*. But the practice of using a later name in the hope that at some future date it may be conserved against an older valid name seems a somewhat dubious procedure.

Finally, objections to the splitting of such a well known genus as *Eugenia* are certain to be forthcoming from foresters, agriculturists, horticulturists and others who are perfectly familiar with the name Eugenia but who would resent the substitution of a crop of unfamiliar and not too euphonious names. Their point of view, that generic names should be tampered with as little as possible is, I think, sound. Taxonomists appear apt to forget that their work is not an end in itself, but is the basis upon which all economic work must stand, and the changing of generic names, unless absolutely necessary, hinders and confuses that work. It is bad enough to have to change so many specific names, and indeed protests have been made against this, but such changes are in a different category and are inevitable when any large group of plants is critically examined and compared with those from neighbouring countries.

For the purposes of this revision, therefore, *Eugenia* is retained in its wide sense and the following divisions are proposed as Sections:

1. Calyx tube produced above ovary:
    2. Stamens on the margin of the disc lining the calyx tube, calyx tube not splitting longitudinally after anthesis:
        3. Anther cells not divaricate, usually elongate, opening by longitudinal slits:
            4. Calyx calyptrate, the upper part falling as a lid .. .. § *Cleistocalyx*
            4. Calyx not calyptrate; if lobed, the lobes free .. .. § *Syzygium*
        3. Anther cells globose, divaricate, opening by terminal slits .. .. § *Acmena*
    2. Stamens on inside of calyx tube above disc, calyx tube splitting longitudinally after anthesis § *Fissicalyx*
1. Calyx tube not produced above ovary .. § *Eu-eugenia*

Many authors have stressed the difficulty of defining the species of Eugenia and of giving verbal descriptions which convey a clear idea of the differences between closely related species—differences which may be quite obvious when specimens are compared in the herbarium, or when living trees are examined.

Gagnepain in Bull. Soc. Bot. Fr., 1917, gives a long and detailed account of the characters of Eugenia and the use he makes of them in his account of the genus in Fl. Gen. Indo-Ch., II, 796 (1920). With some of his conclusions I am not in agreement, especially his use of calyptrate petals as a diagnostic character.

The characters which I have found of use in the herbarium and which I have depended upon in this revision are:—

1. The shape of the calyx tube, presence or absence of lobes and shape and size of lobes, presence or absence of pseudostalk. The shape of the calyx tube or of the complete unopened bud just before the petals expand or drop is of great importance and practically constant in each species. The majority of species have a campanulate, obconic or funnel shaped calyx tube narrowed abruptly or gradually to a pseudostalk which is a part of the calyx and not a pedicel. When a pedicel is present the articulation between it and the pseudostalk is evident. In other species the calyx tube is clavate, or very much longer than wide, narrowed gradually to the base or rather suddenly contracted below the ovary and then narrowing gradually (peg-shaped). A few species have a more or less fusiform calyx tube, swollen about the ovary and contracted above and below it. The pseudostalk may be well defined or not. Some of the very small flowered species have an urceolate calyx tube, rounded at the base and without pseudostalk, and often slightly contracted just below the mouth. After anthesis the shape of the calyx tube may alter considerably and in some species it opens out and becomes an almost flat disc.

2. The lobing of the calyx mouth is regarded as a constant and reliable character. All degrees of lobing may be present, the extreme case being where the margin of the calyx is truncate. The lobes may be deep, broad and rounded, broad and shallow, short teeth, or merely undulations of the calyx rim. In *Cleistocalyx* the whole of the upper part of the calyx falls as a lid. The lobes may be persistent or fugacious, either remaining throughout the whole life of the flower and appearing on the apex of the fruit, often enlarged, or dropping off soon after the flower has expanded and giving the appearance of a truncate or wavy calyx rim.

3. The plan of venation of the leaves is very constant for each species. It is best seen in dried specimens and may be classified roughly as follows:—

(*a*) The primary veins much more prominent than the secondaries and quite distinct from them, well spaced and uniting in an intramarginal loop or nerve, with often a fainter intramarginal nerve closer to the leaf margin.

(*b*) Primary veins very numerous and close together, not or hardly distinguishable from the secondaries, or only to be distinguished from them at their junction with the intramarginal nerve. An intramarginal nerve is almost always present, but it is often very close to the leaf margin and inconspicuous.

(*c*) Primary veins fine and close together but quite distinct from any secondaries that may be visible.

(*d*) Primary and other veins very faint or invisible.

The veins, including the finer reticulations, are usually more prominent on the lower surface of the leaf than above, but in several species the venation is raised above in a conspicuous manner.

Gland dotting may take the form of small black dots, minute sunk pits, or sometimes slightly raised pustulations, and this character appears to be reasonably constant in any one species, but it seems to vary somewhat with the age of the leaf.

4. The size, complexity, denseness or laxness of the inflorescence, and the relative stoutness or slenderness of its branches, are of considerable importance. All degrees of complexity may be met with, from solitary axillary flowers or short cymes to much branched axillary or terminal panicles. The position of the inflorescence, whether terminal or axillary, that is, from the youngest twigs, or from the older wood below the leaves, appears to be nearly constant in each species.

5. The shape of the twigs, whether terete, angled, or winged, and the colour of their bark and whether it is smooth or flaky are characters which although apparently trivial are remarkably constant. The same applies, with somewhat less force, to the branches of the inflorescence. It may be pointed out here that the primary shoot in seedlings is almost invariably angled and winged, and that in a few species the very youngest twigs may be winged, but very soon become terete.

6. Characters of importance in the fruit and seed are the size of the fruit, if it is certain that ripe fruit is being examined, the colour of the ripe fruit, the shape and size of the apical umbilicus, and the extent of the remains of the calyx tube, and the presence or absence of calyx lobes. The shape of the fruit is usually more or less globose, depressed globose or pyriform or turbinate. In the clavate flowered group it may be spindle shaped or oblong, but when

a fleshy or pulpy pericarp is present, the shape alters considerably on drying. Seed characters are not very reliable in dried material, but the presence or absence of a long conspicuous hypocotyle and the peculiar structure in such species as *E. claviflora* and *E. Cumingiana,* already referred to, are diagnostic. Gagnepain stresses the importance of the position of the cotyledons in the seed, whether juxtaposed or superposed, but I have not found that this character is a reliable one.

7. Bracts and bracteoles appear to be present in all species, but in most they are very fugacious. In some few species they are persistent and quite conspicuous.

8. The great majority of species are glabrous in all their parts, but one or two are tomentose on the leaves and inflorescence.

In the field there are other characters which may be of considerable value, the most important being bark characters, which are reasonably constant for each species provided that adult, or at least not sapling, trees are examined. Saplings may have very different bark from mature trees, and colour and even texture may be altered by exposure to full sunlight. A short description of the bark of the living tree has been given for each species for which such information has been collected. The terms used in these descriptions are those evolved by Mr. E. J. H. Corner and are as follows:—

Entire: never creviced, cracked, flaky or fissured, but may be pimply or bumpy.

Smooth: may be finely creviced but not flaky, bumpy or pustular.

Creviced: smooth bark cracked into fine, generally longitudinal lines just large enough to admit the edge of a knife blade and no more.

Fissured: bark split into longitudinal gaping furrows.

Rugose-fissured: bark fissured with rugged ridges between the furrows.

Flaky or *Scaly:* bark scaling or breaking off in pieces.

Fibrous-flaky: bark rather fissured but intervals between fissures break up into rather long narrow fibres and scaly pieces.

Dippled-flaky: bark scaling in small rounded thin pieces leaving small patches of clean new bark.

Papery-flaky: flakes consisting of pieces like tissue paper tightly pressed together.

Peeling bark: coming off in scroll-like pieces leaving clean sheets of new bark.

Pustular bark: pimply or bumpy with small lenticels.

There is the usual difficulty in describing the colours of the bark, but the terms used are as simple as possible and no attempt is made to define very exactly shades of colour, which in any case vary slightly from tree to tree of the same species.

Many species have a smooth or finely creviced bark which is whitey-grey, pinkish-grey or pinkish-brown to red. Other distinctive barks are the reddish or brown fissured and often scaly barks, and the orange-red papery-flaky barks. The majority of species seem to have thin barks which strip easily from the wood, but some have a comparatively thick and often dark red or purplish inner bark and some have hard and very fibrous inner bark.

The loan of herbarium material from the following institutions is gratefully acknowledged: Botanic Gardens, Buitenzorg, Java; Royal Botanic Gardens, Calcutta; Forest Research Institute, Dehra Dun; Bureau of Science, Manila; Rijks Herbarium, Leiden; Forest Research Institute, Kepong, Malaya. I have also to thank the authorities at Kew for permission to work in the Herbarium there at various times and for photographs of certain species, and the Director of the Natural History Museum, Paris, for photographs of Lamarckian types. I am deeply indebted to Dr. E. D. Merrill for his helpful comments and advice and for copies of his papers on the Bornean, Chinese and Indo-Chinese Eugenias; to Mr. E. J. H. Corner for helpful criticism and detailed field notes on many species; and to Dr. C. X. Furtado for much help with problems of nomenclature. In addition, the gift of seed of various species from the Sydney Botanic Gardens, the Royal Botanic Gardens, Calcutta, and the United States Department of Agriculture is acknowledged with thanks.

The following abbreviations of the titles of works which may not be familiar to some readers have been used throughout:

"Mat. F.M.P."—Materials for a Flora of the Malayan Peninsula, by Sir George King. This appeared originally in the Journal of the Asiatic Society of Bengal and the part dealing with the Myrtaceae appeared in Vol. LXX, part ii, No. 1 of that Journal, in 1901.

"F.M.P."—Flora of the Malay Peninsula, by H. N. Ridley.

"Journ. Roy. As. Soc. Str. Br."—Journal of the Straits Branch Royal Asiatic Society, later the Malayan Branch.

"Journ. F.M.S. Mus."—Journal of the Federated Malay States Museums.

"S.F.N." is used throughout to signify Singapore Field Number, a single series of numbers used by all collectors from the Botanic Gardens, Singapore.

EUGENIA Linn.

Trees or *shrubs,* glabrous, or rarely tomentose or villous. *Leaves* opposite, exstipulate, usually glandular, penninerved, usually with an intramarginal vein. *Flowers* solitary in the leaf axils, or in heads, or in few flowered or many flowered cymes, panicles or racemes, usually terminal and axillary, sometimes from the leafless branches; bracts and bracteoles usually inconspicuous and fugacious, occasionally conspicuous and persistent; *calyx tube* from globose to narrowly elongate turbinate, not at all, or much produced above ovary, the base often contracted into a pseudostalk, lobes 4 or 5, large and prominent or inconspicuous or none, persistent or caducous, very rarely the calyx limb calyptrate or the upper part of the tube splitting irregularly after anthesis; *petals* usually 4 or 5, free and spreading or more or less connivent or agglutinated and calyptrate; *stamens* usually numerous in several series on the margin of the disc lining the calyx tube, free or very obscurely collected into 4 bundles, or very rarely on the surface of the calyx tube above the disc, anthers versatile, small, the cells parallel or rarely divaricate, opening longitudinally or very rarely by apical slits, connective gland usually present; *ovary* 2-celled, rarely 3– or 4–celled, with few to several ovules in each cell; *style* short or long, usually filiform, stigma punctiform, rarely capitate.

Fruit a berry, but with few (1–2, rarely more) seeds, the rind pulpy or leathery or dry and pithy, the apex usually crowned by the persistent remains of the calyx tube, or the persistent and often enlarged calyx lobes, or both; seeds usually large, the testa membranous, fibrous, cartilaginous, or crustaceous, the cotyledons fleshy, either completely free or partially or wholly fused together.

A genus of about 1,000 species, distributed throughout the tropics.

The following are the most important synonyms for this region: *Syzygium* Gaertn., Fruct. I, 166, t. 33 (1788); *Jambosa* DC., Prodr., III, 286 (1828); *Caryophyllus* Linn., Sp. Pl. ed. 5, 232 (1754) ; *Calyptranthus* Bl., Bijdr., 1089 (1826) ; *Clavimyrtus* Bl., Mus. Bot. Lugd.-Bat., I, 113 (1849) ; *Microjambosa* Bl., Mus. Bot. Lugd.-Bat., I, 117 (1849) ; *Strongylocalyx* Bl., Mus. Bot. Lugd.-Bat., I, 89 (1849) ; *Macromyrtus* Miq., Fl. Ind. Bat. I, i, 439 (1855) ; *Cleistocalyx* Bl., Mus. Bot. Lugd.-Bat., I, 84 (1849) ; *Acmena* DC., Prodr., III, 262 (1828).

KEY TO SECTIONS OF EUGENIA IN MALAYA

1. Stamens on margin of disc lining calyx tube, calyx tube not splitting longitudinally after anthesis 2.
   Stamens on inside of calyx tube above disc, calyx tube splitting longitudinally after anthesis § *Fissicalyx.*
2. Anther cells not divaricate, usually elongate, opening by longitudinal slits .. .. 3.
   Anther cells globose, divaricate, opening by terminal slits .. .. § *Acmena.*
3. Calyx calyptrate, not lobed, the upper part falling as a lid .. .. § *Cleistocalyx.*
   Calyx not calyptrate; if lobed, the lobes free § *Syzygium.*

§ SYZYGIUM, KEY TO GROUPS

1. Calyx tube including pseudostalk at least 1 cm. long .. .. 2.
   Calyx tube including pseudostalk less than 1 cm. long .. .. 4.
2. Calyx tube campanulate, broadly obconic, broadly funnel shaped or subglobose .. .. 3.
   Calyx tube fusiform or gradually narrowed from apex to base, or clavate or pegshaped *Group 5.*
3. Inflorescences very short, flowers usually few, usually fascicled or in short cymes *Group 1.*
   Inflorescences usually spreading and many flowered, racemiform or panicled, not very short, or fascicled, or of contracted cymes *Group 2.*
4. Calyx tube campanulate, urceolate, obconic or broadly funnel shaped .. .. *Group 3.*
   Calyx tube narrowly funnel shaped, tapering evenly from apex to base .. *Group 4.*

KEY TO MALAYAN SPECIES OF EUGENIA § SYZYGIUM

Group 1

Flowers large, calyx tube including pseudostalk 1 cm. or more long, more or less campanulate, broadly obconic or broadly funnel-shaped or subglobose, not clavate, fusiform, narrowly funnel-shaped or peg shaped, lobes usually conspicuous and often persistent, inflorescences very short, usually fascicled or in short cymes, not spreading, panicled or racemiform, usually few flowered.

1. Inflorescences on branches below leaves .. 2.
   Inflorescences terminal or axillary .. 4.
2. Leaf bases narrowed on to petiole (1) *malaccensis.*
   Leaf bases cordate or rounded, not narrowed to petiole .. .. 3.
3. Leaves tapering gradually from base to apex, broadest near base .. (2) *tekuensis.*
   Leaves broadest about middle, tapering to each end .. .. .. (4) *perakensis.*
4. Leaf bases cordate or rounded, not tapering on to petiole .. .. .. 5.
   Leaf bases narrowed on to petiole .. 14.
5. Calyx tube globose-turbinate, suddenly contracted into a rather long slender pseudostalk (5) *aquea.*
   Calyx tube not globose-turbinate, narrowed gradually to base, not suddenly contracted 6.
6. Inflorescence branchlets and peduncle exceedingly stout, nerves below slender and not elevate, leaf base auricled .. .. (6) *auriculata.*
   Inflorescence branchlets slender .. 7.
7. Vegetative branchlets strongly angled or winged 8.
   Vegetative branchlets terete or at most slightly compressed .. .. .. 9.
8. Main nerves almost at right angles to midrib, not conspicuous below, leaves oblong (7) *quadrata.*
   Main nerves leaving midrib at less than a right angle, conspicuous below, leaves ovate to elliptic (15) *Scortechinii.*
9. Leaves very large, c. 30 cm. or more long and c. 20 cm. broad, deeply cordate, main nerves very prominent below, 20–2·5 pairs, 2–2·5 cm. apart .. .. (8) *scalarinervis.*

Leaves not as above, not so broad, not deeply cordate, main nerves not exceeding 15 pairs, less prominent .. .. .. 10.

10. Leaves oblong lanceolate, often long acuminate, broadest near base, main nerves slender but elevate below, running straight to a conspicuous and elevate intramarginal nerve .. 11.

Leaves elliptic, oblong or lanceolate, broadest near middle, main nerves usually not strongly elevate below, or if they are, then curving to intramarginal .. .. .. 12.

11. Leaves not exceeding 15 cm. long and 5 cm. broad, drying blackish; calyx tube 1–1·25 cm. long (9) *porphyranthera.*

Leaves usually over 15 cm. long, drying brownish or yellowish; calyx tube 1·5 cm. or more long (16) *diospyrifolia.*

12. Inflorescence sessile, flowers sessile (17) *pseudoformosa.*

Inflorescence peduncled, flowers pedicelled .. 13.

13. Calyx tube broadly campanulate, often somewhat swollen at base .. (16) *diospyrifolia.*

Calyx tube broadly funnel-shaped, narrowed gradually to base, not swollen (10) *siamensis.*

14. Leaves thick, not exceeding c. 5 cm. long, elliptic to obovate, apex rounded, mountain shrub (11) *oreophila.*

Leaves thin, more than 5 cm. long, not obovate, apex acute to acuminate, lowland trees .. 15.

15. Leaves narrow lanceolate, long narrowed to both ends, long acuminate .. .. 16.

Leaves usually elliptic to ovate, not long acuminate 19.

16. Pedicels usually 1 cm. or more long, cultivated tree (12) *Jambos.*

Pedicels not exceeding 5 mm., or flowers sessile, not cultivated .. .. .. 17.

17. Calyx tube rounded at base, leaves lead colour on both surfaces when dry .. (13) *plumbea.*

Calyx tube narrowed gradually to base, leaves drying paler below than above .. 18.

18. Leaves drying blackish above, brownish white or greyish white below, up to 16 × 4·5 cm., pedicels c. 4–5 mm. .. .. (14) *Rostadonis.*

Leaves drying brown above, pale brown below, flowers usually nearly sessile (18) *tiomanensis.*

19. Flowers pedicellate, pedicels 6–10 mm. long (19) *pendens.*
Flowers sessile or pedicel less than 5 mm. long 20.
20. Calyx very abruptly contracted into a pseudostalk 8–10 mm. long, leaves oblong elliptic, abruptly narrowed at apex and base (20) *johorensis.*
Calyx gradually narrowed into a pseudostalk 3–4 mm. long, leaves ovate to lanceolate, rather long narrowed at base (15) *Scortechinii* var. *cuneata.*

GROUP 2

Flowers generally smaller than in Group 1, but calyx including pseudostalk at least 1 cm. long, campanulate, obconic or funnel shaped, not clavate, fusiform, narrowly funnelshaped or pegshaped. Inflorescences terminal and axillary, usually spreading and many flowered, racemiform or panicled, not very short, or fascicled, or in contracted cymes.

1. Leaves cordate or rounded at base, not narrowed on to petiole .. .. .. 2.
Leaves narrowed on to petiole, not cordate or rounded .. .. .. 6.
2. Lower surface of leaves, inflorescence and calyx tube softly pubescent .. (22) *pseudomollis.*
All parts glabrous .. .. .. 3.
3. Flowers densely crowded at ends of inflorescence branchlets, subtended by conspicuous persistent bracts and bracteoles almost as long as calyx tube; leaves cordate amplexicaul (23) *papillosa.*
Flowers densely crowded or not, bracts and bracteoles, if present, fugacious and inconspicuous; leaves shortly rounded at base .. 4.
4. Calyx tube more or less globose above and suddenly contracted into a slender pseudostalk, fruit turbinate; cultivated .. .. (5) *aquea.*
Calyx tube funnel shaped or campanulate and narrowed gradually to a short pseudostalk, fruit globose or pyriform .. .. 5.
5. Flowers in a dense inflorescence, sessile or shortly pedicelled, nerves and reticulations raised above and conspicuous; wild tree of inland forest (24) *densiflora.*
Flowers in a lax inflorescence, usually long pedicelled, nerves and reticulations not raised and conspicuous above; cultivated, or wild near sandy seacoasts .. .. (21) *javanica.*

6. Nervation of leaves (except midrib) very obscure or practically invisible on both sides, or where visible, the primaries close together and not distinguishable from secondaries, leaves rhomboid, c. 4 × 1·25 cm. (25) *rhomboidea.*
   Nervation quite visible, at least on lower surface, primaries usually spaced, leaves not rhomboid, usually much more than 4 cm. long .. 7.
7. Leaves linear lanceolate, 6–10 times as long as broad, not exceeding c. 2 cm. broad (26) *salictoides.*
   Leaves always broader in proportion to length, not linear lanceolate, always exceeding 2 cm. wide 8.
8. Nerves and reticulations well marked and conspicuous on upper surface of leaf and often strongly elevate .. .. .. 9.
   Nerves and reticulations usually faint on upper surface, the reticulations at least not raised and conspicuous, often obscure, the primaries usually quite visible but slender .. .. 12.
9. Leaves rounded at apex or with a very short blunt point, always more or less obovate (27) *garcinifolia.*
   Leaves acute or acuminate at apex, never obovate 10.
10. Leaves narrowly oblong elliptic or oblong lanceolate, with 2 well marked intramarginal nerves, the inner c. 1 cm. from leaf margin, calyx lobes 4–5 mm. tall .. .. (24) *densiflora.*
    Leaves not oblong, intramarginal nerve 1, or if 2, the inner much less than 1 cm. from margin, calyx lobes less than 4 mm. tall .. 11.
11. Inflorescence c. 6 cm. long with very stout branchlets, almost as stout as vegetative branchlets, leaves c. 5 cm. broad with abrupt deflexed point; mountain plant .. (28) *selangorensis.*
    Inflorescence much longer, with slender branchlets, leaf 8 cm. or more broad, apex not abruptly deflexed; seashore or cultivated (30) *grandis.*
12. Leaves more or less obovate or oblanceolate, tapering from above middle to petiole, branchlets white or yellow, calyx tube not contracted into a pseudostalk .. .. (31) *pachyphylla.*
    Leaves never obovate or oblanceolate, branchlets reddish or brownish, calyx tube contracted into a distinct, even if very short, pseudostalk 13.

13. Inflorescence short, 5–6 cm. long with few flowers 14.
Inflorescence longer and densely flowered, or if not longer than c. 6 cm., with 30–50 or more flowers 15.

14. Leaves not exceeding c. 20 cm. long, drying greenish or pale brown below, inflorescence branches slender .. .. (19) *pendens.*
Leaves exceeding 25 cm. long, drying red brown below, inflorescence branches, short, stout (32) *atronervia.*

15. Calyx tube tapering gradually to a very short pseudostalk, leaves narrowly oblong elliptic or oblong lanceolate .. (24) *densiflora.*
Calyx tube rather suddenly contracted into a short rather slender pseudostalk, leaves elliptic or ovate .. .. (29) *palembanica.*

GROUP 3

Flowers small, calyx tube including pseudostalk less than 1 cm. long, usually less than 6 mm. long, campanulate, urceolate, obconic or broadly funnel shaped, not tubular, peg shaped, fusiform or narrowly funnel shaped, mouth lobed or not, but lobes not spreading, not conspicuous, fugacious or persistent, inflorescences usually terminal or axillary, rarely on branches below leaves, usually many flowered.

1. Mouth of calyx tube in mature bud cut into 4 or 5 distinct lobes, the lobes broad, rounded, triangular, blunt or acute .. .. 2.
Mouth of calyx tube in mature bud not distinctly lobed, but truncate, or wavy or with very shallow broad obscure lobes, or the lobes reduced to small points .. .. .. 149.

2. Leaf bases rounded or cordate, not narrowed on to petiole .. .. .. 3.
Leaf bases narrowed on to petiole .. 14.

3. Primary nerves spaced, c. 1 cm. distant and distinct, at least below, even if slender, more prominent than secondaries, intramarginal nerve usually distinct .. .. .. 4.
Primary nerves close together and not more prominent than secondaries, or very obscure or invisible, intramarginal nerve usually obscure or very close to margin .. .. 10.

4. Under surface of leaves, twigs, inflorescences and calyx softly pubescent .. (22) *pseudomollis.*
All parts glabrous .. .. .. 5.

5. Flowers in dense heads at ends of inflorescence branchlets, bracts and bracteoles conspicuous and persistent, almost as long as calyx tube, leaves amplexicaul .. (23) *papillosa.*
Flowers not in dense heads, bracts and bracteoles very small or fugacious, leaves not amplexicaul 6.

6. Leaves large, 25 cm. or more long, narrow oblong, with 25 or more pairs of primary nerves (60) *pergamentacea.*
Leaves much smaller and shorter, with fewer pairs of primary nerves .. .. .. 7.

7. Inflorescence from twigs below leaves and shorter than leaves, with very few distant flowers (34) *kemamanensis.*
Inflorescence terminal or from upper axils, usually as long as or longer than leaves .. 8.

8. Flowers not densely crowded, inflorescence branchlets slender .. (35) *cordifoliata.*
Flowers crowded (but not in heads), ultimate branchlets of inflorescence short, rather stout 9.

9. Leaves drying greenish, edge strongly revolute, apex retuse or rounded, nerves and reticulations raised and rather conspicuous above (37) *viridescens.*
Leaves drying dark brown, edge slightly revolute, apex bluntly acute, upper surface polished or smooth, nerves and reticulations obscure or invisible .. .. (36) *subdecussata.*

10. Calyx club shaped, c. 8–9 mm. long, long narrowed to base .. (124) *spissifolia.*
Calyx much shorter, not club shaped and long narrowed to base .. .. 11.

11. Leaves with close raised conspicuous reticulation below, rarely exceeding c. 5 cm. long (38) *Wrayi.*
Leaves rarely less than c. 6 cm. long, nerves and reticulations not raised and conspicuous below 12.

12. Leaf bases usually subcordate, leaves smooth above, nerves not elevate above .. (36) *subdecussata.*
Leaf bases never subcordate, nerves and reticulations more or less raised above .. 13.

13. Leaves drying brownish, broadest near base, usually more or less acute, calyx lobes triangular subacute .. .. (40) *pahangensis.*
Leaves drying greenish, usually rounded or retuse at apex, more or less obovate, calyx lobes rounded .. .. (37) *viridescens.*

14. Primary nerves spaced, more prominent, at least below, than secondaries and easily distinguished from them . . . . . . 15.
Primary nerves numerous, close together, hardly or not distinguishable from secondaries, or very obscure, or invisible . . . . 101.

15. Inflorescences from branches below leaves or from axils of fallen leaves . . . . 16.
Inflorescences terminal or from upper axils . . 19.

16. Calyx tube urceolate, without pseudostalk (104) *conglomerata.*
Calyx tube campanulate or obconic, with or without pseudostalk . . . . . . 17.

17. Calyx after anthesis opening out into a flat disc, pseudostalk slender, inflorescence few flowered, leaves usually c. 15 cm. or more long with c. 15 pairs of primary nerves (105) *leptostemon.*
Calyx not opening into a flat disc, pseudostalk very short or none, leaves rarely exceeding 10–12 cm. long with rarely more than 12 pairs of primary nerves . . . . . . 18.

18. Twigs with very pale, almost white bark, calyx obconic, not narrowed into a pseudostalk (106) *pseudosubtilis.*
Twigs with reddish or brownish bark, calyx campanulate, narrowed into a short pseudostalk (110) *polyantha.*

19. Primary nerves not more than 15 pairs . . 20.
Primary nerves more than 15 pairs . . 80.

20. Flowers on filiform pedicels 10 mm. or more long, inflorescence laxly few flowered (71) *filiformis.*
Flowers pedicelled or not, but pedicels not filiform and always much less than 10 mm. long, flowers usually crowded . . . . . . 21.

21. Bracts conspicuous, as long as, or almost as long as calyx . . . . 22.
Bracts small and not conspicuous, if persistent, much shorter than calyx . . . . 23.

22. Inflorescences very short and dense, not exceeding 2–3 cm. long, bracts persistent (42) *Hoseana.*
Inflorescences 5 cm. or more long, bracts not persistent . . . . (31) *pachyphylla.*

23. Calyx broadly funnel shaped (more or less cylindric with spreading limb), not narrowed into a pseudostalk, often strongly ribbed or angled 24.

Calyx not as above, usually narrowed into a pseudostalk, tube obconic or very small, rarely strongly angled or ribbed .. .. 26.

24. Young twigs angled, with raised lines, calyx, twigs and leaves pustulate .. (43) *variolosa.*
Young twigs terete, without raised lines, calyx, twigs and leaves not pustulate .. 25.

25. Branchlets with pale polished bark, leaves more or less obovate or oblanceolate (31) *pachyphylla.*
Branchlets with dark, not polished bark, leaves more or less elliptic or oblong (44) *chlorantha.*

26. Calyx in mature bud more or less obconic, not exceeding c. 5 mm. long, not contracted at base into a pseudostalk .. .. 27.
Calyx usually campanulate, always more or less contracted into a pseudostalk, short or long, stout or slender; or if without pseudostalk, then more than 6 mm. long .. .. .. 32.

27. Bracts and bracteoles persistent or subpersistent, about one third as long as calyx .. 28.
Bracts and bracteoles fugacious and minute 29.

28. Leaves drying greenish, fruit ellipsoid, rugulose (97) *chloroleuca.*
Leaves drying brownish, fruit ovoid or obovoid, not rugulose .. .. (45) *Ngadimaniana.*

29. Leaves oblong lanceolate acuminate, inflorescence branches minutely pustulate (96) *pustulata.*
Leaves not oblong lanceolate, inflorescence branches not pustulate .. .. .. 30.

30. Twigs with very pale bark (106) *pseudosubtilis.*
Twigs with brown or blackish bark .. 31.

31. Leaves obovate, rounded at apex or shortly acute; shrub of open mountain tops (41) *tahanensis.*
Leaves more or less elliptic, acuminate; tree of lowland forest .. (45) *Ngadimaniana.*

32. Leaves small, not more than c. 3 cm. wide .. 33.
Leaves larger, always 4 cm. or more wide .. 43.

33. Apex of leaf blunt or shortly acute, never acuminate 34.
Apex of leaf always more or less acuminate .. 38.

34. Bark of inflorescence branchlets rough and scaling in small flakes, leaves usually drying greenish (46) *Helferi.*
Bark of inflorescence branchlets smooth or striate, not flaky, leaves not drying greenish .. 35.

35. Inflorescence much shorter than leaves, 1–2 cm. long, bark of twigs pale .. (113) *alyxifolia*.

Inflorescence as long as or longer than leaves, bark of twigs reddish or black .. .. 36.

36. Leaves not more than c. 5 cm. long, reticulations almost invisible above, bark of twigs black; mountain tree .. .. (112) *orites*.

Leaves rarely less than 6 cm. long, reticulations usually raised and conspicuous above, bark of twigs reddish; lowland or seacoast trees 37.

37. Leaves glaucous below .. (48) *glauca*.

Leaves not glaucous below (48) *glauca* var. *pseudoglauca*.

38. Bark of inflorescence branchlets rough and scaling in small flakes, leaves usually drying greenish (46) *Helferi*.

Bark of inflorescence branchlets smooth or striate, leaves not drying greenish .. .. 39.

39. Calyx with unequal lobes, 2 larger than others and subpetaloid .. (49) *anisosepala*.

Calyx lobes equal or subequal, none subpetaloid 40.

40. Nerves and reticulations raised and conspicuous on upper surface of leaf .. .. 41.

Reticulations not raised and conspicuous above, primary nerves slightly raised or sunk .. 42.

41. Calyx tube abruptly contracted above ovary; cotyledons fused; tall tree .. (126) *flosculifera*.

Calyx tube not so contracted; cotyledons free; small trees .. .. .. 43.

42. Inflorescences usually below leaves, never terminal, leaves drying brown, primary nerves slightly raised above .. .. (110) *polyantha*.

Inflorescences terminal, leaves drying black, primary nerves slightly sunk above (111) *Koordersiana*.

43. Calyx lobes unequal, 2 larger than others and subpetaloid .. .. (49) *anisosepala*.

Calyx lobes subequal, none subpetaloid .. 44.

44. Inflorescence branchlets with rough bark scaling in small flakes .. ... (46) *Helferi*.

Inflorescence branchlets smooth or striate, not flaky .. .. 45.

45. Bracts and bracteoles persistent, c. one-third length of calyx, fruit ellipsoid, drying pale and rugulose (97) *chloroleuca*.

Bracts and bracteoles minute or fugacious, fruit more or less globose, not drying pale or rugulose 46.

46. Inflorescences from below leaves, never terminal or from upper axils .. .. .. 47.
Inflorescences terminal or from upper few axils .. .. 48.

47. Leaves usually 15 cm. or more long, with 15 pairs of primary nerves, calyx after anthesis opening out into a flat disc, inflorescences few flowered (105) *leptostemon.*
Leaves rarely exceeding 10–12 cm. long, primary nerves rarely more than 12 pairs, calyx not opening into a flat disc, inflorescence many flowered .. .. (110) *polyantha.*

48. Nerves and reticulations raised on upper surface of leaf and conspicuous .. .. 49.
Secondary nerves and reticulations not raised on upper surface, inconspicuous or invisible, primary nerves usually slender, often sunk 58.

49. Apex of leaf acuminate .. .. 50.
Apex of leaf rounded, obtuse, shortly bluntly acute, or with an abrupt short point .. 53.

50. Inflorescence branches very stout, apex of leaf abruptly deflexed; mountain plant (28) *selangorensis.*
Inflorescence branches slender, apex of leaf not deflexed; lowland plants .. .. 51.

51. Pseudostalk slender, distinct, about half the length of the calyx tube (48) *glauca* var. *pseudoglauca.*
Pseudostalk short and stout .. .. 52.

52. Calyx lobes more or less orbicular, c. 1–2 mm. tall (66) *Haniffii.*
Calyx lobes broad and shallow, less than 1 mm. tall (70) *Brantiana.*

53. Leaves sessile, or petioles not more than 2–3 mm. long; mountain plant .. (37) *viridescens.*
Leaves not sessile, petioles usually exceeding 5 mm. long; lowland plants .. .. 54.

54. Leaves glaucous below .. (48) *glauca.*
Leaves not glaucous below .. .. 55.

55. Calyx ribbed, rather abruptly contracted into a short stout pseudostalk .. (29) *palembanica.*
Calyx not ribbed, narrowed gradually into pseudostalk .. .. .. 56.

56. Primary branches of inflorescence very stout, as stout as twigs, flowers densely crowded, petals usually calyptrate .. (50) *Kiahii.*
Primary branches of inflorescence slender, thinner than twigs .. .. .. 57.

57. Calyx lobes distant, petals usually calyptrate, flowers densely crowded
(50) *Kiahii* var. *angustifolia*.

Calyx lobes approximate, petals free, flowers not densely crowded
(51) *Burkilliana* var. *garcinifolioides*.

58. Inflorescences racemose, not panicled .. 59.

Inflorescences paniculate .. .. 62.

59. Calyx after anthesis opening out into a flat disc, pseudostalk slender .. (105) *leptostemon*.

Calyx not opening into a flat disc, pseudostalk stout
60.

60. Inflorescence very short, almost sessile, not exceeding c. 2 cm. long, leaves thin, conspicuously gland dotted .. .. (43) *variolosa*.

Inflorescences usually several in each axil, peduncled, c. 5 cm. long or longer .. 61.

61. Pseudostalk less than half length of calyx
(52) *Duthieana*.

Pseudostalk about half length of calyx
(53) *Griffithii*.

62. Secondary branchlets of inflorescence very short, usually under 1 cm. long, and as stout as twigs, leaves more or less orbicular .. (50) *Kiahii*.

Secondary branchlets of inflorescence over 1 cm. long, usually slender, spreading, or if not more than 1 cm. long, much more slender than twigs, leaves not orbicular .. .. 63.

63. Flowers densely crowded, secondary branchlets of inflorescence slender, not exceeding c. 1 cm. long
64.

Secondary branchlets of inflorescence 2 cm. or more long, flowers not densely crowded except sometimes at ends of branchlets .. .. 65.

64. Primary nerves usually 4–5 pairs, curving sharply up to intramarginal, young twigs whitey-brown
(33) *Millsii*.

Primary nerves more than 6 pairs, running nearly straight to intramarginal, young twigs reddish brown .. .. (66) *Haniffii*.

65. Inflorescences short and fewflowered, often from lower axils, calyx after anthesis opening out into a flat disc .. .. (105) *leptostemon*.

Inflorescences terminal or from upper axils, many flowered, calyx not opening into a flat disc 66.

66. Calyx suddenly contracted or narrowed into a well marked rather slender pseudostalk about half length of calyx tube .. .. 67.
Calyx with very short stout pseudostalk less than half length of tube .. .. 75.

67. Twigs somewhat angled and with definite raised lines between nodes
(54) *Thumra* var. *penangiana*.
Twigs terete without raised lines .. 68.

68. Calyx in mature bud c. 8 mm. long, 5 mm. across mouth, longitudinally ribbed (29) *palembanica*.
Calyx shorter and not so wide, not ribbed .. 69.

69. Primary nerves and intramarginal noticeably sunk above .. .. .. 70.
Primary nerves and intramarginal not noticeably sunk above .. .. .. 71.

70. Bark of twigs whitish, calyx c. 4 mm. long
(55) *Swettenhamiana*.
Bark of twigs reddish or red brown, calyx 6–7 mm. long .. .. .. (53) *Griffithii*.

71. Intramarginal nerve 1–3 mm. from leaf margin, not more .. .. .. 72.
Intramarginal nerve at least 4 mm. from margin, usually more .. .. .. 74.

72. Primary nerves leaving midrib almost at a right angle, twigs with almost black, very smooth bark .. .. (56) *subhorizontalis*.
Primary nerves leaving midrib at an angle of 50–60 degrees, bark of twigs reddish, often rather flaky .. .. 73.

73. Leaves glaucous below, usually under 10 cm. long
(48) *glauca*.
Leaves not glaucous below, usually over 10 cm. long
(53) *Griffithii*.

74. Calyx lobes rather spreading in bud, not closely adpressed over petals, flowers green, young leaves blue ... .. (57) *Ridleyi*.
Calyx lobes not spreading in bud, closely adpressed over petals, flowers white, young leaves purple
(53) *Griffithii*.

75. Primary nerves rarely more than 4–5 pairs, twigs with greyish white bark, often somewhat angled and with raised lines between the nodes
(33) *Millsii*.
Primary nerves always more than 6 pairs, twigs with blackish, reddish or brownish bark, terete, without raised lines .. .. 76.

76. Calyx in mature bud c. 8 mm. long and 5 mm. wide, ribbed .. .. (29) *palembanica.*
Calyx shorter and narrower, not ribbed .. 77.

77. Leaves rarely more than c. 10 cm. long, primary nerves not more than c. 12 pairs, usually less, inflorescence usually longer than leaves .. 78.
Leaves rarely less than c. 15 cm. long, with 12–15 pairs of primary nerves, inflorescences not longer than leaves .. .. 79.

78. Calyx lobes more or less orbicular and overlapping in bud .. .. (111) *Koordersiana.*
Calyx lobes broad and shallow, not overlapping in bud .. .. (70) *Brantiana.*

79. Leaves rarely more than c. 23 cm. long, inflorescences from half as long to as long as leaves (58) *Dyeriana.*
Leaves usually over 25 cm. long, inflorescences rarely reaching half their length (59) *Hemsleyana.*

80. Flowers on long filiform pedicels 10 mm. or more long, inflorescence laxly few flowered (71) *filiformis.*
Flowers sessile or pedicelled, pedicels much less than 10 mm. long .. .. 81.

81. Calyx narrowed or contracted suddenly at base into a well marked, short or long, stout or slender pseudostalk .. .. .. 82.
Calyx without definite pseudostalk .. 97.

82. Inflorescence branches with rough bark scaling in small flakes .. .. (46) *Helferi.*
Inflorescence branches smooth or striate, not flaky 83.

83. Inflorescences less than half length of leaves, usually racemiform, occasionally paniculate 84.
Inflorescences at least half length of leaves, usually paniculate, occasionally racemiform .. 89.

84. Calyx opening after anthesis into a flat disc, inflorescences usually from lower axils (105) *leptostemon.*
Calyx not opening into a flat disc, inflorescences terminal or from upper axils .. 85.

85. Calyx, twigs and leaves pustulate (43) *variolosa.*
Calyx, twigs and leaves not pustulate .. 86.

86. Leaves not exceeding c. 13 cm. long, drying greenish, flowers crowded in a dense inflorescence broader than long .. (66) *Haniffii.*

Leaves exceeding 16 cm. long, drying blackish, reddish or brownish, flowers not densely crowded, except at ends of inflorescence branchlets, inflorescence longer than broad .. 87.

87. Leaves markedly oblong .. (60) *pergamentacea.*
Leaves more or less elliptic .. .. 88.

88. Calyx c. 8–9 mm. long .. (32) *atronervia.*
Calyx c. 5–6 mm. long .. (59) *Hemsleyana.*

89. Leaves 20–25 cm. long or more .. .. 90.
Leaves rarely exceeding 15–17 cm. long .. 91.

90. Leaves oblong .. (60) *pergamentacea.*
Leaves elliptic .. .. (59) *Hemsleyana.*

91. Leaves glaucous below, bark of young twigs usually scaly flaky .. (48) *glauca.*
Leaves not glaucous below, bark of young twigs usually smooth .. .. .. 92.

92. Inflorescences nearly sessile or very shortly pedunculate, branching widely from base, petiole c. 5 mm. long .. (61) *Gageana.*
Inflorescences definitely peduncled, petiole c. 1 cm. long .. .. .. 93.

93. Inflorescence of clustered racemes (53) *Griffithii.*
Inflorescences paniculate .. .. 94.

94. Inflorescence lax with sparse slender branchlets 95.
Inflorescence dense with crowded branchlets 96.

95. Twigs with nearly black bark, nerves and reticulations slightly raised on upper surface (56) *subhorizontalis.*
Twigs with red or brown bark, secondary nerves and reticulations obscure or invisible above, primary nerves often sunk .. (53) *Griffithii.*

96. Inflorescence branches stout, fruit with apical calyx tube c. 5–6 mm. long .. (62) *Prainiana.*
Inflorescence branches slender, apical calyx tube on fruit none .. .. (64) *oblata.*

97. Bracts and bracteoles persistent, about one-third as long as calyx tube, fruit ellipsoid, drying pale and rugulose .. .. (97) *chloroleuca.*
Bracts and bracteoles fugacious or minute, fruit not ellipsoid, or drying pale and rugulose .. 98.

98. Leaves oblong lanceolate, inflorescence branches and twigs minutely pustulate .. 99.
Leaves elliptic to oblong- or ovate-elliptic, inflorescence branches and twigs not pustulate 100.
99. Inflorescence a short panicle, calyx c. 4–5 mm. long, sessile .. .. (96) *pustulata.*
Inflorescence of short racemes, calyx c. 6–8 mm. long, pedicelled .. .. (43) *variolosa.*
100. Calyx tube cylindric, ribbed, leaves drying greenish or pale brown, not exceeding c. 15 cm. long (44) *chlorantha.*
Calyx tube not cylindric or ribbed, leaves drying reddish or blackish brown, usually over 20 cm. long .. .. (59) *Hemsleyana.*
101. Flowers on filiform pedicels 10 mm. or more long (71) *filiformis.*
Flowers sessile, or if pedicelled, pedicels not filiform and much shorter .. .. 102.
102. Leaves not exceeding 6–7 cm. long, caudate acuminate .. .. .. 103.
Leaves usually exceeding 10 cm. long, acuminate, acute or blunt, rarely caudate acuminate, or if less than 10 cm. long, not caudate acuminate 115.
103. Inflorescence branchlets with rough bark, scaling in small flakes .. .. (46) *Helferi.*
Inflorescence branchlets with smooth, striate, or scurfy but not flaky bark .. .. 104.
104. Inflorescence racemose, few flowered (3–6), very much shorter than leaves .. .. 105.
Inflorescences paniculate, many branched, or fascicled, many flowered, usually at least half length of leaves .. .. .. 106.
105. Calyx suddenly contracted at base into a short slender pseudostalk .. (72) *caudata.*
Calyx gradually narrowed to base (74) *Benjamina.*
106. Inflorescence branches and branchlets square, strongly 4–angled or almost winged .. 107.
Inflorescence branches and branchlets terete or more or less compressed and striate, not strongly angled or winged .. .. 109.
107. Calyx more or less campanulate, not ribbed; nervation usually invisible on upper surface of leaf, not raised and often obscure below (73) *oleina.*
Calyx broadly funnel shaped, vertically ribbed or ridged .. .. .. 108.

108. Petals with conspicuous glands, fruit smooth without persistent calyx lobes; lowland tree (81) *linocieroidea.*
Petals without glands, fruit ridged, with persistent calyx lobes; mountain tree .. (82) *goniocalyx.*

109. Flower buds narrow, not exceeding c. 2 mm. diam. at widest point .. .. .. 110.
Flower buds wider, always 3 mm. or more diam. at widest point .. .. .. 112.

110. Calyx suddenly contracted into a slender pseudostalk about half length of tube, inflorescence branches smooth .. (75) *syzygioides.*
Calyx gradually narrowed into a pseudostalk, inflorescence branches scurfy or pustulate 111.

111. Inflorescence branches scurfy, calyx not pustulate (76) *castanea.*
Inflorescence branches pustulate, calyx tube more or less pustulate .. (77) *pseudosyzygioides.*

112. Calyx more or less campanulate or obconic, not angled or ribbed .. .. 113.
Calyx broadly funnel shaped, more or less angled or ribbed .. .. .. 114.

113. Inflorescence branches stout, twigs with pale polished bark .. .. (65) *laevicaulis.*
Inflorescence branches slender, twigs with brownish, not polished bark .. (78) *praestigiosa.*

114. Leaves rarely more than 2–2·5 cm. broad, fruit globose without persistent calyx lobes, dark coloured in life, inner bark thick (81) *linocieroidea.*
Leaves usually over 2·5 cm. broad, fruit more or less oblong, with persistent calyx lobes, white in life, inner bark thin .. (79) *longiflora.*

115. Bark of inflorescence branches rough, scaling in small flakes .. .. (46) *Helferi.*
Bark of inflorescence branches smooth or striate, not flaky .. .. .. 116.

116. Calyx contracted or narrowed at base into a definite rather slender pseudostalk about half length of tube .. .. .. 117.
Pseudostalk very short and stout or none .. 126.

117. Inflorescences in axils of all leaves, very short with few branches, not reaching one quarter length of leaves, leaves narrow lanceolate, 5–6 times as long as broad (47) *Graeme-Andersoniae.*
Inflorescences at least half as long as leaves, much branched, terminal or from upper axils, leaves broader in proportion to length .. 118.

118. Inflorescence peduncle very stout, almost or quite as stout as twigs, secondary branchlets usually also stout, not exceeding c. 1 cm. long, flowers very densely crowded .. .. 119.
Inflorescence peduncle slender, thinner than twigs, secondary branchlets also slender and often exceeding 1 cm. long .. .. 121.

119. Leaves oblong orbicular with a very short blunt point .. .. .. (50) *Kiahii.*
Leaves more or less elliptic, acuminate .. 120.

120. Calyx tube in mature bud over 5 mm. long, fruit oblong with a long apical calyx tube (62) *Prainiana.*
Calyx tube less than 5 mm. long, fruit globose without apical calyx tube .. (66) *Haniffii.*

121. Calyx suddenly contracted into a slender pseudostalk .. .. (75) *syzygioides.*
Calyx gradually narrowed to base .. 122.

122. Calyx lobes dropping soon after petals fall, not persisting in fruit .. .. 123.
Calyx lobes persistent, appearing on the apex of at least the young fruit .. .. 124.

123. Calyx tube slightly swollen near base, leaves more or less oblong elliptic or oblong lanceolate, shortly narrowed to apex and base, length about 2–2½ times breadth .. (80) *tumida.*
Calyx tube not swollen near base, leaves lanceolate long narrowed to apex and base, length about 3–4 times breadth .. (67) *camptophylla.*

124. Fruit oblong, almost white when ripe, nerves and reticulations hardly raised on upper surface of leaf .. .. (79) *longiflora.*
Fruit more or less globose, dark coloured, nerves more or less raised above .. .. 125.

125. Mature flower buds 7–9 mm. long, leaves usually over 12 cm. long, drying reddish or blackish brown above, gently acuminate (64) *oblata.*
Mature flower buds 5–6 mm. long, leaves not usually exceeding 10–11 cm. long, drying greenish or pale brown above, rather abruptly acuminate .. .. (66) *Haniffii.*

126. Bracts and bracteoles persistent, more or less conspicuous, often persisting to fruiting stage, one quarter to one third length of calyx tube .. .. .. 127.
Bracts and bracteoles very small and not conspicuous, or dropping early and not persistent 129.

127. Inflorescence branchlets very stout, as stout as twigs, flowers in heads at their apices (83) *quadribracteata.*
Inflorescence branches slender, flowers not in heads 128.

128. Inflorescence half as long or as long as leaves, spreading, fruit glandular, leaves drying reddish or brownish .. (98) *fastigiata.*
Inflorescences not reaching half length of leaves, fruit eglandular, leaves drying greenish or pale brown .. .. (97) *chloroleuca.*

129. Flowers very small, calyx not exceeding c. 4·5 mm. long and 3–3·5 mm. across mouth .. 130.
Flowers larger, calyx at least 5 mm. long, usually more, and c. 5 mm. across mouth or more 139.

130. Inflorescence with few branchlets almost or quite as stout as twigs, flowers in dense heads at their apices .. .. (83) *quadribracteata.*
Inflorescence many branched, branchlets thinner than twigs, flowers not in dense heads 131.

131. Leaves long acuminate, lanceolate .. 132.
Leaves not long acuminate, or if so, not lanceolate 133.

132. Twigs with pale bark, leaves drying pale brown with strongly revolute edges, inflorescence branchlets striate or more or less compressed, not sharply 4-angled; tree of mountain forest (84) *cyrtophylloides.*
Twigs with red brown or blackish bark, leaves drying reddish or dark brown, edges not revolute, inflorescence branchlets usually smooth, strongly and sharply 4-angled; tree of lowland forest, usually near mangrove (73) *oleina.*

133. Bark of twigs pale, almost white .. 134.
Bark of twigs reddish, brownish or black .. 135.

134. Petioles usually over 5 mm. long, leaves drying brown to black .. (106) *pseudosubtilis.*
Petioles under 5 mm. long, usually c. 2 mm. long or none, leaves drying greenish (37) *viridescens.*

135. Leaves elliptic or lanceolate, not obovate or oblanceolate .. .. .. 136.
Leaves more or less obovate or oblanceolate, apex rounded or with short abrupt point .. 137.

136. Leaves elliptic, acutely acuminate, usually over 3 cm. wide, inflorescence branches not strongly angled .. .. (70) *Brantiana.*
Leaves more or less lanceolate, acute or bluntly acuminate, rarely more than c. 2·5 cm. wide, inflorescence branches strongly angled (73) *oleina.*

137. Leaves almost sessile, or petioles not more than 2–3 mm. long .. .. (37) *viridescens.*
Leaves distinctly petioled, petioles usually exceeding c. 5 mm. long .. .. 138.

138. Twigs with black bark, leaves 5–6 cm. broad; shrub .. .. (41) *tahanensis.*
Twigs with greyish or brownish bark, leaves rarely more than 3·5–4 cm. broad; tree (85) *cerina.*

139. Leaves narrow oblong lanceolate, inflorescences short, c. 2–2·5 cm. long in axils of all leaves; river bank tree .. (47) *Graeme-Andersoniae.*
Leaves not as above, inflorescences terminal or from upper axils; not river bank trees 140.

140. Leaves very long narrowed to base, petiole c. 2 cm. long; cultivated .. .. *aromatica.*
Leaves not very long narrowed to base, petiole not exceeding c. 1·5 cm., usually 1 cm. or less; wild 141.

141. Twigs very stout, c. 5 mm. diam. near uppermost pair of leaves, inflorescence peduncle and branchlets almost as stout .. .. 142.
Twigs and inflorescence branchlets slender, twigs c. 2–3 mm. diam. near uppermost pair of leaves 143.

142· Reticulations more or less raised and easily visible on upper surface of leaves, bark of twigs dark, leaves 5–6 cm. broad, apex deflexed (28) *selangorensis.*
Reticulations invisible above, bark of twigs pale, leaves 3–4 cm. broad, apex not deflexed (65) *laevicaulis.*

143. Leaves small, not exceeding c. 5 cm. long, rhomboid, oblanceolate or obovate .. (25) *rhomboidea.*
Leaves longer, usually over 6 cm. long, not rhomboid, oblanceolate or obovate .. 144.

144. Calyx more or less cylindric below, usually strongly ribbed, inflorescence rather lax, the branches strongly angled, almost winged, leaves up to c. 15 × 8 cm. .. .. (44) *chlorantha.*

Calyx not cylindric below, gradually narrowed to base, not ribbed, at most more or less striate, inflorescence dense, branchlets striate or compressed, leaves not exceeding c. 12 × 5 cm. 145.

145. Twigs with pale yellow or greyish white bark 146.
Twigs with reddish or brownish bark .. 147.

146. Calyx lobes overlapping in bud, more or less orbicular, c. 3 mm. tall .. (87) *Goodenovii.*
Calyx lobes not overlapping in bud, triangular, c. 1 mm. tall .. .. (65) *laevicaulis.*

147. Inflorescence narrow, individual inflorescences with few branches, leaves coriaceous, edge strongly revolute .. (78) *praestigiosa.*
Inflorescence wide, individual inflorescences much branched, leaves thin, edge slightly revolute 148.

148. Leaves drying greenish or pale brown, usually c. 10 cm. long, fruit globose, c. 1·5 cm. diam. (66) *Haniffii.*
Leaves drying reddish or blackish brown, less than 10 cm. long, fruit oblong, c. 1 cm. long (79) *longiflora.*

149. Leaves rounded or subcordate at base, not narrowed on to petiole .. .. .. 150.
Leaf bases narrowed on to petiole .. 151.

150. Stems and inflorescence branches covered with reddish bristles, leaves oblong lanceolate cuspidate, up to c. 3 cm. wide .. (89) *setosa.*
Stems and inflorescence branches glabrous, leaves elliptic blunt, usually more than 4–5 cm. wide (36) *subdecussata.*

151. Base of calyx suddenly contracted or narrowed into a distinct more or less slender pseudostalk one third or more the length of the calyx .. 152.
Calyx without pseudostalk, or pseudostalk very short and stout and not distinct .. 179.

152. Inflorescence branches with rough scaly or flaky bark .. .. (88) *Curtisii.*
Inflorescence branches with smooth or striate bark 153.

153. Primary nerves bold and raised below, much more prominent than secondaries or reticulations 154.
Primary nerves faint or invisible below, or if raised, not much more prominent than secondaries and reticulations .. .. 156.

154. Inflorescences not exceeding 2–5 cm. long, bark of young twigs flaky .. (90) *pauper*.
Inflorescences 5 cm. or more long, bark of young twigs not flaky .. .. .. 155.

155. Inflorescence lax, twigs terete, leaves 12–15 cm. long .. .. .. (91) *Klossii*.
Inflorescence dense, twigs with raised lines, or more or less angled and winged, leaves usually 20 cm. or more long .. .. (92) *valdevenosa*.

156. Apex of leaf rounded, blunt, or with short blunt abrupt point .. .. .. 157.
Apex of leaf acute, acuminate, or caudate acuminate 160.

157. Inflorescence peduncle and branchlets very stout, as thick or almost as thick as twigs, leaves oblong orbicular .. .. (50) *Kiahii*.
Inflorescence peduncle and branchlets slender, thinner than twigs, leaves not oblong orbicular 158.

158. Leaves elliptic to ovate, inflorescence usually below leaves; cultivated ... (93) *Cumini*.
Leaves more or less obovate, inflorescences terminal or from upper axils; wild .. .. 159.

159. Nerves and reticulations raised on upper surface of leaf, lower surface drying reddish brown, inflorescence dense .. (95) *Muelleri*.
Nerves and reticulations almost invisible above, not raised, lower surface drying pallid brown, inflorescence lax .. .. (99) *pallidula*.

160. Flowers very small, mature bud c. 2–3 mm. long, calyx rather abruptly contracted just below mouth .. .. (125) *leucoxylon*.
Flowers larger, mature buds at least 4 mm. long and usually longer, calyx not so contracted 161.

161. Primary and secondary nerves and often reticulations raised and easily visible on upper surface of leaf .. .. .. 162.
Nerves, at least secondaries and reticulations, obscure or invisible on upper surface of leaf 170.

162. Mature flower buds 9–10 mm. long, bark of older twigs scaly flaky .. (100) *nemestrina*.
Mature buds not exceeding c. 7 mm. long, bark of twigs not scaly or flaky .. .. 163.

163. Leaves caudate acuminate, the cusp 1·5–2 cm. long, calyx and inflorescence branches minutely pustulate .. (77) *pseudosyzygioides.*
Leaves not caudate acuminate, or if so, cusp 1 cm. or less long, calyx and inflorescence not pustulate .. .. .. 164.

164. Leaves small, up to c. 6 × 3 cm., abruptly acuminate, petiole c. 5 mm. long (101) *taipingensis.*
Leaves larger, usually 8 cm. or more long and longer in proportion to width, or if smaller, not abruptly acuminate, petiole usually over 5 mm. long .. .. .. 165.

165. Reticulation close and raised on upper surface of leaf, as prominent as primary and secondary nerves .. .. (102) *nigricans.*
Reticulation not raised on upper surface, or if so much less prominent than primaries and secondaries .. .. .. 166.

166. Inflorescences usually below leaves, fruit ovoid oblong; cultivated .. (93) *Cumini.*
Inflorescences terminal or from upper axils, fruit more or less globose; wild .. 167.

167. Upper surface of leaf drying paler than lower, pale brown or greenish brown .. (94) *oblongifolia.*
Upper surface drying darker than lower, reddish brown or blackish brown .. .. 168.

168. Calyx 3·5–4 mm. across mouth, pseudostalk distinct, rarely more than 2 mm. long (68) *inophylla.*
Calyx narrower, c. 2–2·5 mm. across mouth, pseudostalk longer than 2 mm. and well defined, or the calyx gradually narrowed into pseudostalk 169.

169. Calyx rather abruptly contracted into a pseudostalk 3–4 mm. long, tube not swollen near base, leaves usually over 10 cm. long (103) *cerasiformis.*
Calyx gradually narrowed into pseudostalk, and usually slightly swollen near base, leaves rarely more than 10 cm. long .. (80) *tumida.*

170. Mature flower buds 9–10 mm. long, bark of older twigs scaly flaky .. (100) *nemestrina.*
Mature buds not exceeding c. 8 mm. long, usually less, bark of twigs not scaly or flaky .. 171.

171. Leaves abruptly caudate acuminate .. 172.
Leaves not abruptly caudate acuminate .. 174.

172. Inflorescence branches filiform, inflorescence lax, flowers distant, calyx c. 4 mm. across mouth (72) *caudata.*

Inflorescence branches not filiform, inflorescence many branched, more or less densely flowered, calyx c. 2 mm. across mouth .. 173.

173. Calyx long narrowed into pseudostalk, often slightly swollen near base, not pustulate, cusp of leaf usually c. 1 cm. long .. (80) *tumida.*

Calyx more or less abruptly contracted into pseudostalk, minutely pustulate, cusp of leaf usually 1·5–2 cm. long .. (77) *pseudosyzygioides.*

174. Leaves small, usually less than 8 × 3·5 cm., bluntly acute or acuminate, branches of inflorescence paler than twigs, with almost smooth bark and strongly 4-angled, almost winged (73) *oleina.*

Leaves usually longer and broader, apex acute, branches of inflorescence not paler than twigs, more or less striate, usually compressed, not strongly 4-angled or winged .. .. 175.

175. Calyx 3·5–4 mm. across mouth, pseudostalk distinct, rarely more than c. 2 mm. long .. 176.

Calyx narrower, c. 2–2·75 mm. across mouth, pseudostalk longer and well defined, or calyx gradually narrowing to pseudostalk .. 177.

176. Bark of twigs drying pale brown to reddish brown, stamens 15–16 mm. long .. (70) *Brantiana.*

Bark of twigs drying dark, almost black, stamens not more than c. 10 mm. long (68) *inophylla.*

177. Calyx rather abruptly contracted into a pseudostalk 3–4 mm. long, leaves usually over 10 × 5 cm. .. .. (103) *cerasiformis.*

Calyx gradually narrowed into pseudostalk, leaves usually shorter or narrower: if longer than 10 cm. then not exceeding 4 cm. wide, if wider than 5 cm., not reaching 10 cm. long .. 178.

178. Leaves lanceolate, long acuminate, calyx not swollen near base .. (67) *camptophylla.*

Leaves elliptic or oblong elliptic, shortly acuminate, calyx tube often swollen near base (80) *tumida.*

179. Flowers very small, mature buds not exceeding c. 4 mm. long, usually 2·5–3 mm. long 180.

Flowers larger, mature buds 5 mm. or more long 190.

180. Inflorescence branches covered with red scurf, flower buds more or less globular
(88) *Curtisii* var. *minor.*
Inflorescence branches glabrous, buds not globular
181.

181. Leaves more or less oblanceolate or obovate, apex rounded or with a short blunt point .. 182.
Leaves not oblanceolate or obovate, apex acute or acuminate, sometimes very shortly or bluntly so
185.

182. Primary nerves numerous, faint on lower surface and hardly more prominent than secondaries and reticulations, bark of twigs flaky
(85) *cerina.*
Primary nerves few, spaced, distinct from secondaries and reticulations even if faint, bark of twigs not flaky .. .. 183.

183. Leaves small, not more than c. 4 cm. long, primary nerves 3–4 pairs .. (108) *myriantha.*
Leaves larger, usually over 5 cm. long, primary nerves more than 4 pairs .. .. 184.

184. Bark of twigs dark, red or brown, bracteoles persistent .. .. (107) *microcalyx.*
Bark of twigs almost white, bracteoles not persistent .. (106) *pseudosubtilis.*

185. Primary nerves close and numerous, not more prominent than secondaries, or very obscure or invisible .. .. .. 186.
Primary nerves not more than about 15 pairs, usually less, spaced, and more prominent than secondaries below, even if faint .. 187.

186. Leaves small, up to 6 × 2·5 cm., nerves almost invisible .. .. (86) *avenis.*
Leaves large, usually 10 × 4 cm. or more, nervation raised and easily visible on both sides
(69) *Bernardi.*

187. Primary nerves and reticulations strongly raised on lower surface of leaf, intramarginal nerve 2–5 mm. from margin .. (109) *Kunstleri.*
Primary nerves not or only slightly raised below, intramarginal nerve faint or none .. 188.

188. Inflorescence very short and compact, not reaching half length of leaves, with very short branchlets, leaves with strongly recurved margins, youngest twigs 4-angled; mountain shrub
(113) *alyxifolia.*

Inflorescence spreading, half as long as leaves or longer, branchlets slender, long, margins of leaves not strongly recurved, youngest twigs terete or compressed; trees, usually lowland 189.

189. Bracteoles persistent, although minute, bark of twigs dark .. .. (107) *microcalyx.*
Bracteoles not persistent, bark of twigs pale (106) *pseudosubtilis.*

190. Inflorescence branches stout, almost as thick as twigs, ultimate branchlets not exceeding c. 1 cm. long, inflorescence compact, not spreading 191.
Inflorescence branches slender, thinner than twigs, ultimate branchlets usually over 1 cm. long, inflorescence spreading .. .. 195.

191. Leaves almost sessile, drying greenish or pale brown .. .. (37) *viridescens.*
Leaves distinctly petioled, drying brown or red 192.

192. Primary nerves very fine on under surface of leaf, or invisible, intramarginal obscure or not more than 1 mm. from margin .. .. 193.
Primary nerves distinct below, intramarginal distinct and 2–5 mm. from margin .. 194.

193. Leaves rather thick, more or less caudate acuminate, inflorescences almost sessile (63) *Pearsoniana.*
Leaves thick, not caudate acuminate, inflorescences peduncled .. .. (39) *inasensis.*

194. Leaves nearly as broad as long, very shortly narrowed to base, apex with very short broad point .. .. .. (50) *Kiahii.*
Leaves narrowly elliptic or oblong, more than twice as long as broad, base cuneate, apex more or less acute .. (50) *Kiahii* var. *angustifolia*

195. Leaves almost or quite sessile, or petioles less than 5 mm. long .. .. .. 196.
Leaves distinctly petioled, petioles usually c. 1 cm. long or more .. .. 197.

196. Inflorescence branches with smooth bark, strongly 4-angled, almost winged, leaves drying reddish or brownish; lowland plant .. (73) *oleina.*
Inflorescence branches terete or slightly compressed, bark striate, leaves drying greenish or pale brown; mountain plant .. (37) *viridescens.*

197. Inflorescences usually below leaves, fruit ovoid oblong, petioles often 2 cm. long; cultivated (93) *Cumini*.

Inflorescences terminal or from upper axils, fruit more or less globose, petioles rarely reaching 2 cm.; wild .. .. .. 198.

198. Apex of leaf with very short abrupt point, margin crenulate .. (114) *pseudocrenulata*.

Apex of leaf acute or acuminate, margin entire 199.

199. Nervation invisible or very obscure on lower surface of leaf .. .. .. 200.

Nervation, at least primary nerves, easily visible below .. .. .. 201.

200. Inflorescence branches with smooth bark, strongly 4-angled; lowland tree .. (73) *oleina*.

Inflorescence branches with striate bark, terete or slightly compressed; mountain tree (39) *inasensis*.

201. Inflorescence branches with smooth bark, sharply 4-angled .. .. .. 202.

Inflorescence branches with striate bark, terete or more or less compressed, not sharply 4-angled, or if angled, bark not smooth .. 203.

202. Calyx tube often slightly swollen near base, c. 5 mm. long, inflorescence branches usually ascending, leaves usually c. 4 cm. broad, elliptic oblong, oblong lanceolate, or sometimes obovate (80) *tumida*.

Calyx tube not swollen at base, c. 3–3·5 mm. long, inflorescence branches often horizontal, leaves usually narrow lanceolate, rarely more than c. 3 cm. wide .. .. (73) *oleina*.

203. Primary nerves spaced and sufficiently distinct from secondaries on under surface of leaf 204.

Primary nerves close together, numerous and hardly or not distinguishable from secondaries 206.

204. Inflorescences dense, many branched, terminal, rarely axillary, branches ascending .. 205.

Inflorescences lax, few branched, terminal and axillary, branches often horizontal (103) *cerasiformis*.

205. Leaves drying dark, usually blackish brown, more or less acuminate, calyx usually c. 6 mm. long (68) *inophylla*.

Leaves drying pale brown, bluntly acute, calyx not more than 5 mm. long (50) *Kiahii* var. *angustifolia*.

206. Mature flower buds less than 5 mm. long, rather abruptly narrowed at base, the fine nerves and reticulations raised on both surfaces of leaf (69) *Bernardi.*

Mature buds more than 5 mm. long, gradually narrowed to base, nerves and reticulations hardly raised above .. .. 207.

207. Calyx tube usually slightly swollen near base, leaves elliptic oblong to obovate, rarely more than 10 cm. long .. .. (80) *tumida.*

Calyx tube not swollen near base, leaves narrowly ovate or elliptic, usually over 10 cm. long (68) *inophylla.*

GROUP 4

Calyx tube narrowly funnel shaped, tapering evenly from apex to base, but often contracted at base into a pseudostalk, glandular, pustulate, or deeply wrinkled, often pruinose or glaucous, calyx lobes rather conspicuous, broad, not spreading but more or less incurved or continuing the line of the calyx tube.

1. Flowers in rather dense heads or condensed panicles, conspicuously bracteate, the bracts often papery, and as long as or longer than flowers .. .. .. 2.

Bracts small and inconspicuous or none .. 5.

2. Leaf bases broad and more or less cordate, primary nerves strongly raised below, intramarginal nerve conspicuous, petiole strongly transversely wrinkled (115) *tetraptera* var. *pseudotetraptera.*

Leaf bases narrowed on to petiole, or more or less rounded, never cordate, primary nerves usually faint or invisible below, intramarginal nerve obscure, petiole not or only slightly transversely wrinkled .. .. .. 3.

3. Flowers in condensed panicles .. (116) *polita.*

Flowers in sessile heads .. .. 4.

4. Leaves thin, up to c. 6 × 2·5 cm., often strongly black dotted below, calyx not pustulate (118) *jasminifolia.*

Leaves thick, up to c. 3 × 1·75 cm., not black dotted below, calyx minutely pustulate (119) *nitidula.*

5. Leaves with primary nerves and intramarginal nerves strongly raised below, twigs with conspicuous wavy wings .. (115) *tetraptera.*
   Primary and intramarginal nerves obscure and faint below, twigs angled or not, but without wavy wings .. .. .. 6.
6. Leaves small, very thick, not exceeding c. 2·5 cm. long .. .. .. 7.
   Leaves larger, not very thick, usually at least 4 cm. long and often longer .. .. 8.
7. Leaves broadly ovate, usually c. 2·5 cm. broad, almost sessile, base cordate, calyx not or only slightly pustulate .. (120) *clypeolata.*
   Leaves narrower, not more than c. 1·5 cm. broad, usually less, usually distinctly petioled, not cordate, calyx conspicuously pustulate (121) *Stapfiana.*
8. Calyx conspicuously pustulate .. (122) *spicata.*
   Calyx wrinkled, not pustulate .. .. 9.
9. Inflorescence panicled, calyx c. 5–6 mm. long, glaucous .. .. (123) *grata.*
   Flowers in fascicles, calyx c. 1 cm. long, not glaucous .. .. (117) *tecta.*

GROUP 5

Calyx tube elongate, usually 1 cm. or more long (except *leucoxylon* and *flosculifera*), fusiform, or gradually narrowed from apex to base, or clavate or pegshaped (suddenly contracted into a long tapering pseudostalk).

1. Calyx small, c. 2·5 mm. long, fusiform, cotyledons fused .. .. (126) *flosculifera.*
   Calyx longer, cotyledons free .. .. 2.
2. Calyx not exceeding 1 cm. long .. .. 3.
   Calyx over 1 cm. long .. .. 6.
3. Calyx clavate, gradually narrowed to base, leaves more or less orbicular, cordate, apex rounded or retuse; shrub .. (124) *spissifolia.*
   Calyx pegshaped, abruptly contracted into a long pseudostalk, leaves not orbicular, narrowed at base, apex acute or acuminate; trees .. 4.
4. Calyx c. 3–4 mm. long, inflorescence spreading, fruit globular, bark of twigs pale (125) *leucoxylon.*
   Calyx c. 6–10 mm. long, inflorescences not spreading, fruit elongate, bark of twigs dark .. 5.
5. Leaves rarely exceeding c. 6 cm. × 2.5 cm., nervation almost invisible, calyx more or less pustulate, bark of trunk papery flaky (127) *attenuata.*

Leaves larger, up to c. 14 cm. × 6 cm., primary nerves below usually easily visible, calyx smooth, bark of trunk not or only slightly papery flaky (129) *rugosa.*

6. Calyx tube fusiform—contracted below lobes and swollen about ovary .. (132) *virens.*

Calyx tube pegshaped or clavate .. 7.

7. Apex of calyx tube much inflated and more or less globular .. .. (130) *fusticulifera.*

Apex of calyx tube not inflated or globular .. 8.

8. Inflorescences very short, fascicled, almost or quite sessile .. .. .. 9.

Inflorescences peduncled, not fascicled .. 11.

9. Leaves usually less than 7 cm. × 2·5 cm., primary nerves below indistinct or invisible (133) *pseudoclaviflora.*

Leaves usually over 9 cm. × 3·5 cm., primary nerves below spaced and distinct from secondaries even if slender .. .. 10.

10. Stamens 5–10 mm. long, calyx tube c. 1·5 cm. long, bark of trunk greyish, not fissured (134) *claviflora.*

Stamens not reaching 4 mm. long, calyx tube less than 1·5 cm. long, bark of trunk reddish and fissured .. .. (129) *rugosa.*

11. Leaves with very fine close nervation raised on both surfaces, primary nerves close together, not distinguishable from secondaries (128) *rhamphiphylla.*

Primary nerves distant and distinct from secondaries, nerves not or only slightly raised above 12.

12. Calyx tube strongly wrinkled, mouth of calyx opening widely after anthesis (131) *napiformis.*

Calyx tube nearly smooth, mouth contracted below lobes, not opening widely .. (129) *rugosa.*

---

1. **Eugenia malaccensis** Linn., Sp. Pl., 470 (1753); Duthie in Hook. fil., F.B.I., II, 471; King, Mat. F.M.P., No. 12, 82; Gagnep. in Fl. Gen. Indo-Ch., II, 839; Koord. & Valet. in Meded. Lands Plantent., XL, 55; Atlas Baumart. Java, III, fig. 445; Ridl., F.M.P., I, 724; Corner, Wayside Trees of Malaya, p. 499. *Syzygium malaccense* (L.) Merr. & Perry in Journ. Arn. Arb., XIX, 215 (1938); Mem. Amer. Acad. Arts & Sci., XVIII, 3, 154. (Fig. 6*a*).

Widely cultivated in the Malay Peninsula. Malay name, *Jambu Bol.*

A medium sized *tree. Twigs* stout, compressed or angled or nearly terete, the youngest with brown bark, the older with pale smooth bark. *Leaves* usually large, but variable in shape and size, from oblong oblanceolate to oblong elliptic or somewhat obovate, coriaceous, drooping, reaching c. 35–36 cm. long and 18 cm. broad, apex obtuse or shortly and abruptly acute, base cuneate or long narrowed;

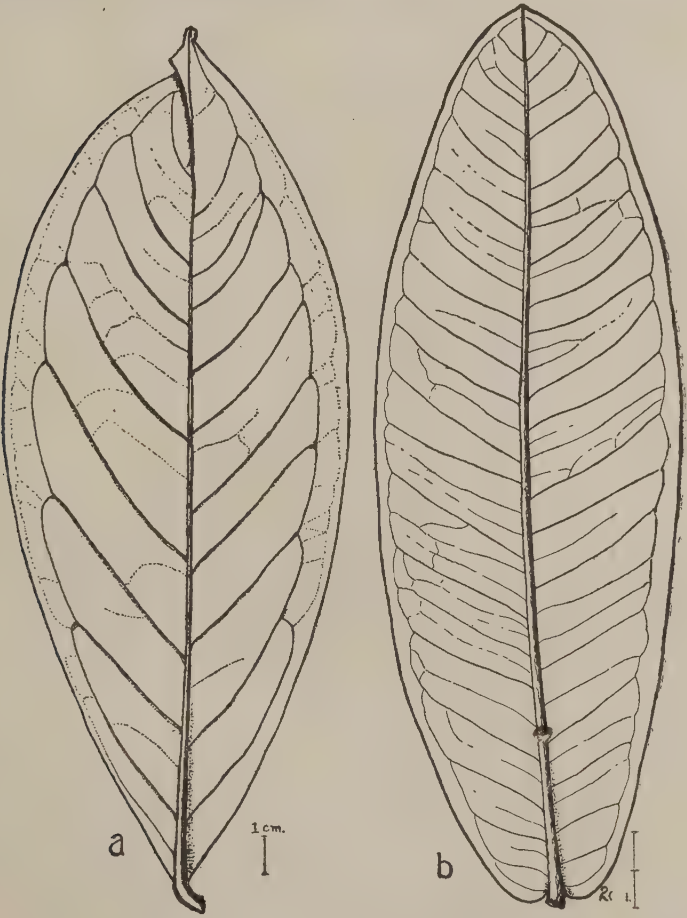

Fig. 6. a, *E. malaccensis;* b, *E. auriculata.*

upper surface drying pale brown or olivaceous brown to dark reddish brown, lower surface pale brown to pale reddish brown, with scattered black dots; midrib rather shallowly impressed above, prominent below; *primary nerves* c. 10–14 pairs, 1–2.5 cm. apart, usually more or less impressed and inconspicuous above, prominent below, obliquely ascending, nearly straight or curving up to a conspicuous looped intramarginal nerve 0·5–1·5 cm. from the leaf margin, with one or two fainter series of loops closer to the margin; secondaries much less prominent than primaries below, reticulations lax and usually faint; petiole stout, 1 cm. or less long.

Flowers crimson pink, in short few flowered fascicles from twigs below the leaves, sessile; *calyx* green, c. 3 cm. long and 1·5 cm. across mouth, excluding lobes, obconic, the upper part more or less cupular, narrowed into a very stout pseudostalk c. 1 cm. long which is often obscurely ribbed; lobes 4, unequal, suberect, persistent, broad and rounded, 1·2–1·5 cm. across, the smaller c. 5–6 mm. tall, the larger 9–10 mm. tall; *petals* 4, free, orbicular-spathulate with a broad short claw, thick textured, gland dotted, c. 1·7 cm. tall; *stamens* numerous, filaments slender, flattened below, terete above, reaching c. 3 cm. long, anthers oblong, a little more than 1 mm. long, connective gland small and inconspicuous; *style* stout, subulate, reaching c. 3·5 cm. long; *ovary* 2-celled, multiovulate.

Fruit oblong or obovoid oblong, 4 cm. long and 2·5 cm. diam., but often larger, white or greenish white, wholly or partially overlaid with pink, apex with the 4 enlarged incurved green calyx lobes and long pinkish style; pericarp thick, white, dryish, somewhat fibrous and pithy; seed depressed globose, c. 1·5–2 cm. diam.; testa brownish, thick, toughly fibrous, adhering closely to the white, glistening very rugose surface of the cotyledons; cotyledons nearly equal or very unequal, inner faces green tinged pink, attached to the hypocotyle by broad stalks twisted through 90 degrees; hypocotyle stout, reaching periphery of the seed. Germination hypogeal.

2. **Eugenia tekuensis** nom. nov.

E. trunciflora Ridl., F.M.P., I, 724 (1922), non G. Don (1832) nec Rich. ex Berg. (1859–60). *E. cauliflora* Ridl. in Trans. Linn. Soc., III, 299 (1893), non DC. (1828) nec Miq. (1849) nec Berg. (1855). (Fig. 7).

PAHANG: Tahan Woods, *Ridley s.n.;* Kuala Teku, *Ridley 16266* (type); Sungai Teku, *SFN 31710* (*Kiah*).
Distrib: Endemic.

A small slender *tree* 8–13 metres tall, bark smooth, dark brown. Youngest *twigs* slender, with smooth brown bark. *Leaves* coriaceous, elongate, oblong lanceolate, up to c. 44 cm. long and 7 cm. broad, gradually acuminate in the upper 1/3 or 1/4, or sometimes from near the base, apex

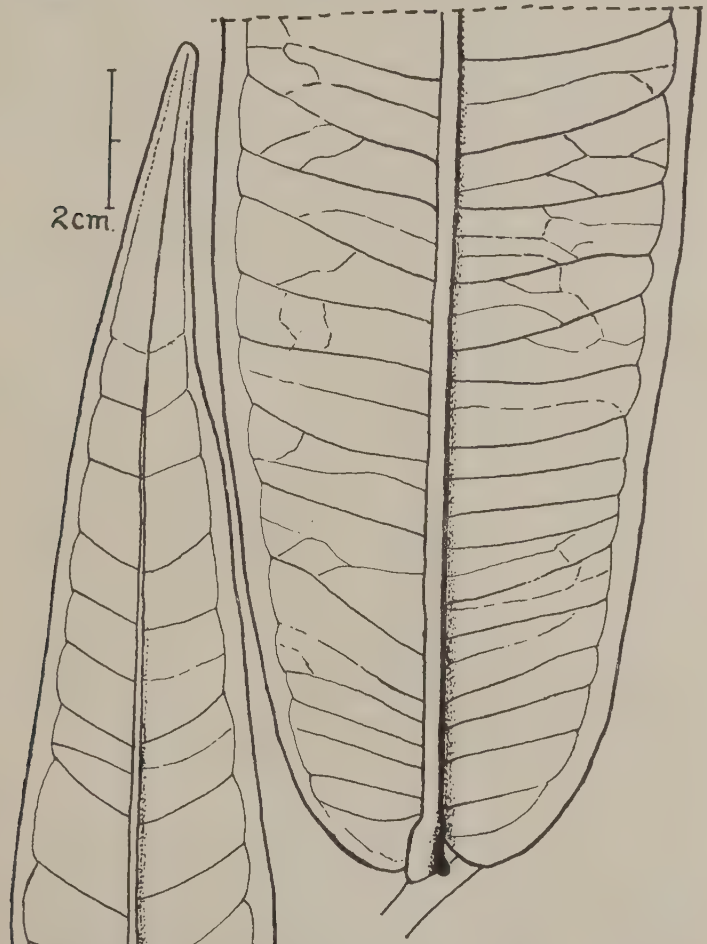

Fig. 7. *E. tekuensis,* apex and base of leaf.

acute or subacute, base broad, sometimes slightly narrowed, rounded and cordate; petiole very short, swollen and wrinkled; midrib impressed above, prominent below, rounded and more or less longitudinally striate; *primary nerves* 25–40 or more pairs, slightly raised and indistinct above, raised and slender below but distinct, about 1 cm. apart, nearly horizontal or at various angles to the midrib, curving up slightly to a somewhat faint intramarginal nerve c. 2–4 mm. from leaf margin; secondaries and reticulations faint above, secondaries below almost as conspicuous as primaries and sometimes not easy to distinguish from them, reticulations lax and faint; upper surface drying reddish or blackish brown, lower surface glaucous (fide Ridley), reddish brown in *SFN 31710*.

Inflorescences from tubercles on the trunk, short, few flowered, sessile or on a peduncle c. 2 cm. long, the peduncle and branchlets slender, 4-angled with brown striate bark. *Calyx* c. 1·2 cm. long, c. 8 mm. across mouth in full grown bud, obconic, narrowed rather abruptly into a slender pseudostalk 2–5 mm. long, pedicel varying between the same limits; *sepals* 4, persistent, broadly ovate, rounded, the two inner ones c. 6 mm. across at base and 3 mm. tall, the outer ones smaller; *petals* 4, ovate rotund, unequal, thin textured, the larger nearly 1 cm. across; *stamens* numerous, slender, up to c. 2·5 cm. long, anthers small, oblong, with a rather conspicuous dark coloured connective gland; *style* slender, about the same length as the stamens; ripe *fruit* unknown.

Ridley describes (in F.M.P.) the flowers as entirely crimson. His field note on the type says they are scarlet. Very young fruits on *SFN 31710* are described as pink.

3. **Eugenia malayana** Gagnep. in Fl. Gen. Indo-Chine, II, 838 (1920). *Jambosa confusa* Bl., Mus. Bot., I, 101 (1849–51). *Eugenia "doligophylla"* Koord. & Valet. in Meded. Lands Plantent., XL, 78 (1900); *? E. dolichophylla* Koord. & Valet., Atlas Baumart. Java, III, fig. 462; non E. dolichophylla Kiaersk. (1893).

KELANTAN: Bukit Bunga Raya, *Forest Dept. FMS 33413*.

E. "doligophylla" Koord. & Valet. is a misprint or mistake for "dolichophylla". The name is a later homonym, having been used by Kiaerskou in 1893 for a Brazilian species. Koorders & Valeton's name was a new name for *Jambosa confusa* Bl., which in its turn was part of *Jambosa lanceolata* Korth., regarded by Blume as a mixture and split by him into three parts—*J. insignis, J. Korthalsii* and *J. confusa*. In 1920 Gagnepain gave the name *E. malayana* to *Jambosa confusa* Bl., but did not cite *E. dolichophylla* Koord. & Valet.

Koorders and Valeton do not give a fresh description of the species, but merely repeat Blume's description. In their figure in Atlas Baumarten v. Java, where the spelling of the specific name is corrected, the inflorescence appears not to be terminal, as all descriptions give it, but cauliflorous or ramiflorous, and the figure, therefore, is more like *E. tekuensis*.

As no material of *E. malayana* has been available for comparison, the specimen cited is placed here with some doubt. A short description of it is given below.

A *tree* c. 7–8 metres tall. *Twigs* terete, drying reddish. *Leaves* narrowly oblong, c. 44 cm. long and 7 cm. broad, tapered gradually from about middle to apex, base cordate, upper surface drying blackish brown, lower surface red brown; midrib impressed above, prominent and rounded below; *primary nerves* c. 30 pairs, 1–2 cm. apart, slightly raised and rather faint above, prominent below, the basal ones nearly horizontal, the upper ones curving up, joining a nearly straight, prominent intramarginal nerve 3–5 mm. from leaf margin, with a much fainter loop close to the margin; secondaries and lax reticulations distinct below, much less prominent than primaries; petiole short and stout, longitudinally grooved, less than 5 mm. long.

Inflorescences terminal, clustered, up to c. 2 cm. long, 3-5-flowered, rachis rather stout, 4-angled and grooved, drying dark; *flowers* sessile or on short stout pedicels, buds 1·7–1·8 cm. long, obovoid, *calyx* c. 1·5 cm. long, campanulate, narrowed rather gradually to a rather short stout pseudo-stalk; lobes 4, broad, ovate, rounded, 4–5 mm. tall; *petals* pellucidly gland dotted.

4. **Eugenia perakensis** King, Mat. F.M.P., No. 12, 81 (1901); Ridl., F.M.P., I, 726, excl. syn. (Fig. 8).

PERAK: sine loc., *Scortechini 185;* Larut, *Kunstler 5595,* type collection; Sungai Krian Estate, Bagan Serai, at sea level, *SFN 34481* (*Spare*).
SELANGOR: Circular road Reserve, Kuala Lumpur, *Forest Dept. FMS 1576, 5750;* Klang river, *Forest Dept. FMS 43732;* Sungai Pelek, Sepang, *Denny s.n.*
Distrib: Endemic.

A straggling *tree,* sometimes in secondary growth on river banks where at high tide the water reaches the base of the trunk; bark silvery or very pale brown, flaky, inner bark pallid buff. Youngest *twigs* with smooth brown bark, conspicuously ridged, stout, older twigs stout, terete, bark whitey-brown or pale brown, flaky or not. *Leaves* in pairs or threes, thickly coriaceous, oblong elliptic or oblong obovate, apex blunt or subacute, narrowed gradually to the more or less oblique, cordate, sometimes amplexicaul base,

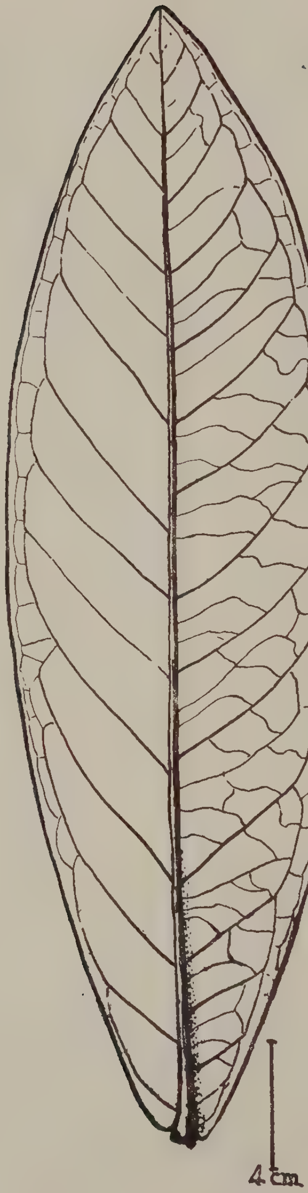

Fig. 8. *E. perakensis.*

very variable in size, reaching c. 33 cm. long and 12 cm. broad, upper surface drying dull brown, smooth, punctate, lower pale brown to reddish brown; midrib slightly impressed above, very prominent and rounded below; *primary nerves* c. 12–14 pairs, 2–5 cm. apart, ascending and curving up to interarch 5–10 mm. from leaf margin, with a very much fainter series of arches much closer to margin, impressed or channelled and faint above, very prominent below, secondaries and reticulations much less prominent but quite distinct, the reticulations lax; petiole very short and stout.

Inflorescences usually from branches, always below leaves but sometimes from axils of fallen leaves; *flowers* 4–8 in very short racemes, peduncle usually less than 1 cm. long, or fascicled, pedicels very variable, up to c. 2 cm. long, subtended by a pair of triangular acute bracts c. 1·5 mm. long, and with a pair of similar but slightly broader and blunter bracteoles at apex; *calyx* campanulate, narrowed to a short pseudostalk, tube deep pink, c. 1·5 cm. long and 1·2–1·3 cm. wide at mouth; lobes 4, semiorbicular, persistent, the two inner larger than outers, c. 5 mm. high and 7 mm. wide; *petals* 4, free, subpersistent, pink, broadly ovate with truncate base, c. 1 cm. high and 8 mm. wide; *stamens* very numerous, filaments white, c. 2 cm. long, anthers narrowly oblong, 1–1·5 mm. long, connective gland very inconspicuous; *style* c. 3·5 cm. long; *ovary* 2-celled with many ovules in each cell.

Fruit c. 2 cm. diam., globose with truncate apex, smooth, deep purplish pink slightly tinged with green, apex with enlarged calyx rim and remains of calyx lobes and style, c. 1·5 cm. diam., the excavation shallow, white tinged pink; pericarp pithy leathery, thin; seeds 3, the testa often peeling off with pericarp; cotyledons pale orange yellow, superposed, stalked, the hypocotyle rather long, pink.

Malay name—*Kayu Kati Lima.*

5. **Eugenia aquea** Burm. f., Fl. Ind., 114 (1768); Duthie in Hook. fil., F.B.I., II, 473; Ridl., F.M.P., I, 724; Koord. & Valet. in Meded. Lands Plantent., XL, 82 (1901); Atlas Baumart. Java, III, figs. 465, 466; Corner, Wayside Trees of Malaya, p. 494. *Syzygium aqueum* (Burm. f.) Alston in Ann. Roy. Bot. Gard. Peradeniya, XI, 204 (1929); Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 170. (Fig. 9*a*).

Cultivated in the Malay Peninsula under the Malay names *Jambu Ayer, Jambu Chili.* Perhaps a native of Southern India.

A *bush* or small *tree* up to c. 10 m. tall, usually much branched, bark smooth, grey. *Twigs* terete with smooth brown bark. *Leaves* decussate, usually ovate oblong or elliptic oblong, up to c. 20 cm. × 10 cm., apex shortly and broadly acute, or blunt, base rounded and usually slightly cordate, almost sessile, petiole less than 5 mm. long; upper surface dull green in life, drying reddish to blackish, paler below, black dotted, drying reddish brown; midrib channelled above, boldly raised below; *primary nerves* up to about 10 pairs, 1–2 cm. apart, ascending, somewhat impressed above when fresh, more or less raised and slender when dry, raised below, meeting in a looped intramarginal nerve c. 5–7 mm. from leaf margin, with a much finer and fainter loop nearer the margin; secondaries and reticulations faint.

Inflorescences axillary, terminal, or from immediately below leaves, shorter than leaves, c. 5 cm. long, peduncle up to 2 cm. long or almost none, with or without a pair of ascending branchlets near the base c. 2–2·5 cm. long, each with 1–3 flowers, the central rachis usually with 5 flowers; rachis and branchlets green in life, and slightly angled, dark brown and striate when dry; bracts and bracteoles small and fugacious. *Flowers* white, greenish or pinkish, *calyx* including pseudostalk c. 1·4 cm. long, hemispherical or oblong above, abruptly contracted into a pseudostalk c. 5 mm. long, lobes 4, erect, not reflexed after anthesis, broadly ovate rounded, c. 4 mm. across at base and 3 mm. high, the calyx tube slightly contracted below lobes; *petals* 4, subpersistent, free, reflexed after anthesis, subrotund, unguiculate at base, c. 5 mm. diam.; *stamens* numerous, up to c. 1·5 cm. long, filaments slender, subulate, anthers small, elliptic, the connective gland very small and inconspicuous; *style* yellowish, c. 1 cm. long, stouter than filaments; *ovary* 2-celled, many ovuled.

Fruit shining white or pink, up to c. 4 cm. across, turbinate with flattened top, the 4 much enlarged and fleshy calyx lobes incurved over and almost hiding the apical excavation, flesh crisp and juicy, often seedless or with several seeds. *Seed* very like that of *E. javanica*, with thick closely adhering pithy testa, surface of cotyledons green, rugose, the internal structure the same as in *E. javanica, E. malaccensis* etc., the cotyledons attached to the hypocotyle by broad stalks.

6. **Eugenia auriculata** Ridl. in Journn. Roy. As. Soc. Str. Br., LXI, 7 (1912); F.M.P., I, 726. (Fig. 6*a*).

DINDINGS: near Lumut, *Ridley 8376* (type collection).
Distrib: Endemic.

? A *tree.* *Branchlets* very stout, terete, with smooth or slightly cracked greyish or brownish bark. *Leaves* very coriaceous, narrowly elliptic, up to c. 23 cm. long and 8 cm. broad, apex apparently shortly acute, lower half of lamina gradually narrowed to a cordate-auriculate base; upper surface drying lead colour, lower surface brown to blackish brown; petiole very stout, short, black, less than 5 mm. long; midrib sunk in a narrow channel above, boldly raised below, blackish and striate; *primary nerves* c. 13–14 pairs, somewhat raised and finely channelled above, rather conspicuous, raised below and somewhat inconspicuous, running straight from midrib and joining an inconspicuous intramarginal nerve c. 3–4 mm. from leaf margin; secondaries almost as conspicuous as primaries but distinguishable from them, reticulations very faint; upper surface of leaf slightly polished, punctate with scattered black dots, lower surface dull, not punctate.

Inflorescences terminal or axillary, 2–3 cm. long, on short, very stout peduncles c. 1 cm. long, or almost sessile, branchlets very short, stout, with blackish or brownish wrinkled bark; *flowers* in threes, white (fide Ridley), sessile; *calyx* campanulate, c. 1·4 cm. long and 1·2 cm. across mouth, base narrowed, pseudostalk none, or very short and stout, not exceeding 2 mm. long when present; calyx lobes apparently soon deciduous, none seen attached to flowers, semiorbicular, strongly gland dotted, 5–6 mm. diam; *petals* free, semiorbicular, c. 5 mm. diam., finely gland dotted; *stamens* numerous, c. 2·5 cm. long, slender, with small anthers; *style* slender, c. 3 cm. long. *Fruit* unknown.

Very little material is known of this species. It is close to *E. perakensis* but appears sufficiently distinct in the less prominently nerved leaves, terete, not angled twigs and in the terminal or axillary inflorescences on short peduncles.

7. **Eugenia quadrata** King, Mat. F.M.P., No. 12, 86 (1901); Ridl., F.M.P., I, 730. (Fig. 9*b*).

PERAK: Larut, *Kunstler 5547* (type collection).
Distrib: Endemic.

A *tree* up to c. 10 m. tall. *Twigs* stout, 4–5 mm. diam., 4-angled and narrowly winged, bark smooth, brown; *Leaves* coriaceous, oblong, much narrowed to the acuminate apex, base slightly narrowed, rounded and cordate, up to c. 25 cm. long and 7·5 cm. broad; upper surface drying brown or olivaceous brown, smooth and punctate, lower surface darker brown or reddish brown, not glandular; midrib impressed above in a narrow channel, raised below; *primary nerves* up to c. 25 pairs, 5–10 mm. apart, obscure above, raised and slender below, almost horizontal and meeting in a fine intramarginal nerve 2–4 mm. from leaf margin, with a much finer loop closer to margin; secondaries and reticulations fine, raised below and distinctly less conspicuous than primaries; petiole 2–3 mm. long, swollen.

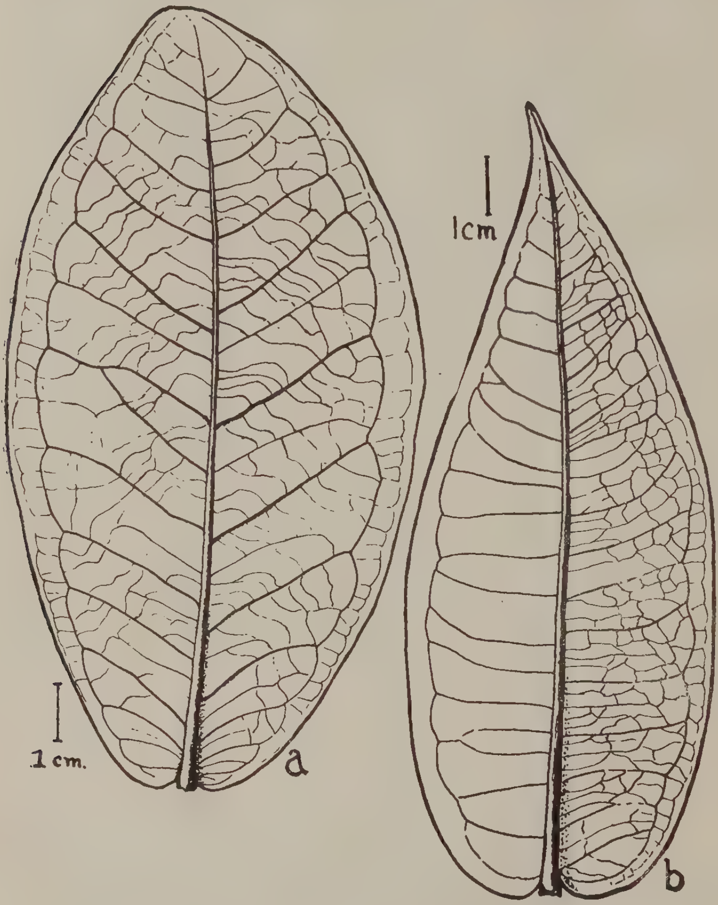

Fig. 9. a, *E. aquea;* b. *E. quadrata.*

Inflorescences terminal or axillary, much shorter than leaves, solitary or fascicled in groups of 3 or 4, 3–flowered, branchlets compressed and striate; *flowers* white, sessile, *calyx* tube c. 1·2 cm. long and 5 mm. across mouth, campanulate, narrowed rather abruptly or gently into a rather slender pseudostalk c. 4 mm. long, lobes 4, broadly ovate triangular, rounded, c. 3 mm. across at base and 2 mm. tall, persistent and eventually reflexed; *petals* 4, free, orbicular, c. 5 mm. diam.; *stamens* numerous, c. 5 mm. long, filaments very slender, subulate, anthers oblong with a dark conspicuous connective gland; *style* much stouter than filaments, c. 1 cm. long. *Fruit* unknown.

The only specimens of this species are very scanty and poor, yet it seems distinct from all others, especially in the oblong broad based leaves with a long tapering apex, the stout angled and winged twigs and the short crowded inflorescences.

8. **Eugenia scalarinervis** King, Mat. F.M.P., No. 12, 87 (1901). (Fig. 10).

PERAK: Gopeng, 300–500 feet, *Kunstler 8200* (syntype); Parit Forest Reserve, *Forest Dept. FMS 34227*.
DINDINGS: Lumut, *Ridley 3095* (syntype).
Distrib: Endemic.

A *tree* c. 10 m. tall. *Branchlets* stout, 8 mm. or more in diam. with dull red brown smooth or finely striate and lenticellate bark. *Leaves* very coriaceous, large, elliptic ovate, subacute, base cordate, rounded, c. 35 cm. × 20 cm., upper surface drying dull brown or blackish brown, minutely and closely punctate, lower surface paler, not, or very sparsely glandular; midrib impressed above, bold and rounded below; *primary nerves* up to c. 30 pairs, impressed above, very prominent below, 1–2 cm. apart, ascending slightly and running nearly straight to a well marked looped intramarginal nerve 5–10 mm. from leaf margin, with a much fainter loop nearer the margin; reticulations wide and few, impressed above, raised below but much less prominent than primaries; petiole up to c. 1 cm. long, very stout.

Inflorescences terminal, few flowered, short and contracted; *calyx* tube magenta coloured (fide Kunstler), c. 2 cm. long, contracted at base into a pseudostalk 3–4 mm. long, pedicel about as long, lobes 4, broadly triangular, c. 4 mm. tall; *petals* not seen; *stamens* 5–7 mm. long. *Style* c. 3 cm. long. *Fruit* (apparently unripe) globular ovoid, smooth, crowned by the wide calyx tube c. 5 mm. tall, fringed by the persistent and more or less enlarged calyx lobes.

Ridley reduces this striking species to *E. perakensis*, but although only rather poor material of it is known, it is quite distinct in the larger broader leaves with a very broad base, the nerves deeply impressed on the upper surface and prominent below, the primary nerves 1–2 cm. apart, and in the terminal inflorescence. In *E. perakensis* the nerves

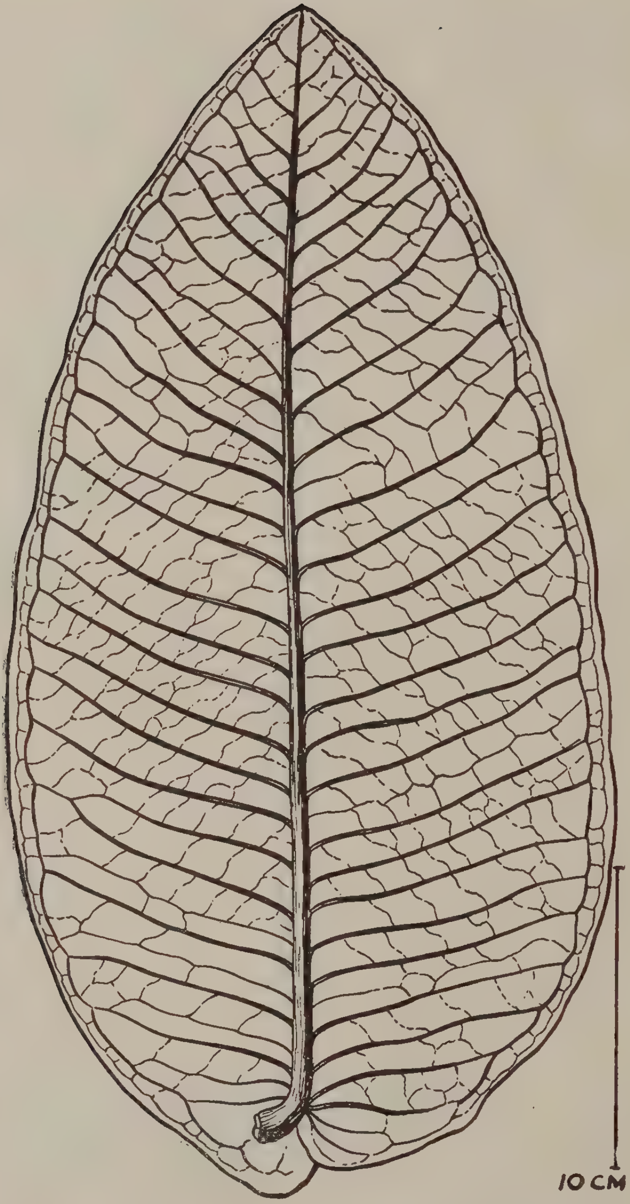

Fig. 10. *E. scalarinervis.*

are not deeply sunk above, the reticulations are only slightly raised below, the primary nerves are 2–4 cm. apart and the leaves are more or less narrowed to the base. The inflorescence is below the leaves or on the trunk.

9. **Eugenia porphyranthera** Ridl. in Journ. Roy. As. Soc. Str. Br., LXI, 8 (1912); F.M.P., I, 727. (Fig. 12*a*).

SELANGOR: Bukit Kutu, *Ridley 7313* (type collection).
Distrib: Endemic.

A *tree* (fide Ridley). *Twigs* very slender, terete with faint raised lines between the nodes, the youngest parts 4-angled, bark smooth, pale brown. *Leaves* broadly lanceolate or somewhat ovate lanceolate, up to 15 cm. × 5 cm., long tapered to an acuminate apex with rounded tip, base rounded and slightly cordate; petiole c. 4 mm. long, somewhat swollen, with black wrinkled bark; midrib impressed above, bold below; *primary nerves* 12–16 pairs, fine above and raised above the leaf surface in channels, giving the effect of being impressed, slender below but raised and conspicuous, running straight to a conspicuous looped intramarginal nerve c. 4–5 mm. from leaf margin, with a much fainter intramarginal c. 1 mm. from margin and traces of a third very close to margin; secondaries and reticulations very fine and raised above, more conspicuous below; both surfaces drying dull, the upper to a lead colour or dark blackish brown, the lower similar, when dark brown with very minute crowded pale gland dots.

Inflorescence 2-flowered (3-flowered, fide Ridley) on a very short peduncle, terminal; *calyx* obconic, c. 1 cm. long, 7–8 mm. across mouth, on a pedicel c. 3 mm. long, narrowed rather abruptly to a pseudostalk c. 3 mm. long; in the material available the calyx lobes are apparently large, orbicular, semipersistent, strongly gland dotted; *petals* not seen; *stamens* numerous (purple fide Ridley), c. 1 cm. long, anthers small, oblong; *style* c. 1·5 cm. long. *Fruit* unknown.

Known only from one collection but distinct in the tapered leaves and very short few flowered terminal inflorescences.

10. **Eugenia siamensis** Craib in Kew Bull. (1912) 153; Fl. Siam. Enum., I, 661; Gagnep. in Fl. Gen. Indo-Ch., II, 843; Ridl., F.M.P., I, 726. (Fig. 11*a*).

KELANTAN: base of Gunong near Kota Bahru, *Ridley s.n.*
KEDAH: Koh Mai Forest Reserve, *SFN 35183* (*Kiah*).
PERLIS: Kaki Bukit, *SFN 35264* (*Kiah*).
Distrib: Siam.

A *shrub* or small *tree* up to c. 3 m. tall. *Twigs* slender, terete, smooth, with pale brown or reddish brown bark. *Leaves* oblong lanceolate or ovate-lanceolate, chartaceous,

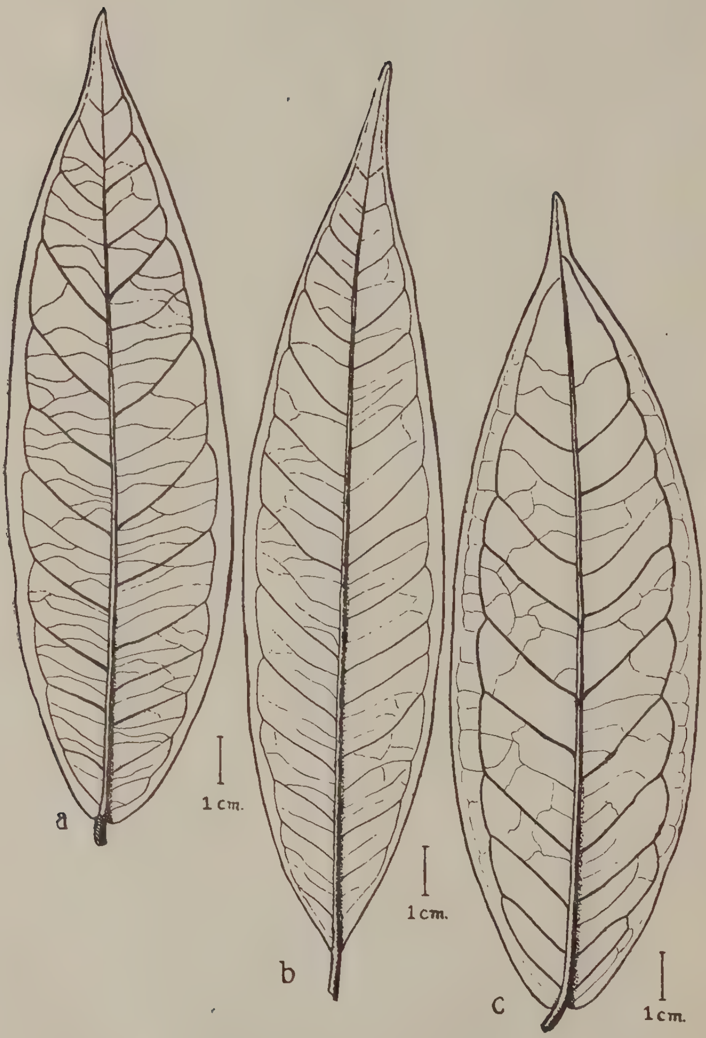
a
1 cm.
b
1 cm.
c
1 cm.

Fig. 11. a, *E. siamensis;* b, *E. Jambos;* c. *E. Scortechinii.*

apex acuminate, acute, base narrowed and rounded, or cuneate, up to 18 cm. × 5·5 cm.; upper surface drying dull greenish or brownish, eglandular, lower surface paler, very sparsely glandular, finely wrinkled; midrib more or less impressed above, prominent below; *primary nerves* up to c. 10 pairs, c. 1 cm. apart, slightly raised and inconspicuous above, raised and distinct below, more or less ascending or curving gently to a shallowly looped intramarginal nerve 3–7 mm. from leaf margin, secondaries and reticulations obscure above, very fine below; petioles 5–8 mm. long, rather stout and wrinkled.

Inflorescences terminal, 3-flowered, peduncle rather stout, angled, c. 5 mm. long, the pedicels slightly less stout, 3–5 mm. long; *calyx* tube funnel shaped, c. 1·5–2 cm. long, 1·3 cm. across mouth, gradually narrowed to a very short stout pseudostalk 2–3 mm. long, lobes 4, broad and rounded, persistent, c. 1 cm. across at base and 5–7 mm. tall; *petals* 4, free, conspicuously gland dotted, orbicular, c. 1·7 cm. diam.; *stamens* numerous, c. 3 cm. long, filaments slender, anthers linear oblong, c. 1 mm. long, connective gland apparently none; *style* stouter than stamens, 4–5 cm. long; *fruit* globose, c. 3 cm. diam. (probably unripe), apex rather widely and shallowly excavate, bearing the persistent calyx lobes and style.

This species is perhaps a little too close to *E. Jambos* but it differs from it mainly in the broader leaves with a less narrowed base and in the fewer primary nerves and less conspicuous reticulation. The flowers are described as red in two of the collections cited above. Ridley describes them as rose at the base and white above, the stamens rose pink. The flowers of *E. Jambos* are normally white.

11. **Eugenia oreophila** Ridl. in Journ. Roy. As. Soc. Str. Br., LXI, 9 (1912); F.M.P., I, 753; *E. jugalis* Ridl. in Journ. F.M.S. Mus., VI, 47 (1915); F.M.P., I, 727. (Fig. 12*b*).

An endemic species not uncommon on hilltops and in ridge forest in Perak, Pahang and Selangor, from 4,000–5,500 feet. The type is *Dennys s.n.* from Ulu Semangkok, Selangor.

A *shrub* or bushy *tree* up to c. 8 m. tall. *Twigs* rather slender, terete, with smooth dark brown bark, the youngest parts paler and often densely lenticellate. *Leaves* coriaceous, variable in size and shape, usually broadly elliptic, sometimes obovate or nearly orbicular, from c. 2·5–9 cm. long and 1·5–5 cm. broad, apex usually rounded, sometimes retuse or very shortly and broadly acute, base narrowed rather abruptly; petiole rather slender, drying black and wrinkled, deeply and narrowly channelled above, up to c. 1 cm. long; midrib impressed above, bold below;

primary nerves from about 4 pairs in small leaves to 9 or 10 in large leaves, from 5–10 mm. apart, raised on upper surface and very slightly more distinct than secondaries and reticulations, raised below and just distinguishable from secondaries, meeting in a looped intramarginal nerve 3–4 mm. from leaf margin; upper surface often shining, greenish brown, lower dull and paler, minutely black dotted.

Inflorescences terminal, up to c. 4·5 cm. long but usually shorter, few flowered, branchlets slender, terete; *calyx* tube more or less campanulate, c. 1 cm. long, including pseudostalk, c. 5 mm. diam. below lobes, narrowed rather abruptly into a slender pseudostalk c. 3–4 mm. long; lobes 4 broad and rounded, varying in size, one usually considerably larger than the others; *petals* 4, free, obovate orbicular, c. 8 mm. tall and 7 mm. broad; *stamens* numerous, c. 1·5 cm. long, anthers oblong, connective gland inconspicuous; *style* 1·5 cm. long.

Fruit globose, c. 1·5–1·75 cm. diam., dull brown or blackish brown, surface rugulose when dry; apical umbilicus shallow, c. 7·5 mm. diam., calyx rim very short, bearing the shrivelled lobes which persist until the fruit is ripe or nearly so, style base stout, c. 2 mm. long; pericarp probably fleshy and somewhat fibrous; seed 1, testa thick, brown, adhering to cotyledons; cotyledons nearly equal, gland dotted, inner faces plane or concave, attached to hypocotyle near their centres.

There is no significant difference to be found between the types of *E. oreophila* and *E. jugalis*, although Ridley puts them in widely separated sections of his key. The petals in both are free.

12. **Eugenia Jambos** Linn., Sp. Pl., 470 (1753): Duthie in Hook. fil., F.B.I., II, 474; King, Mat. F.M.P., No. 12, 82; Gagnep. in Fl. Gen. Indo-Ch., II, 834; Koord. & Valet., Atlas Baumart. Java, III, fig. 444; Ridl., F.M.P., I, 724; Corner, Wayside Trees of Malaya, p. 499, pl. 150. *Syzygium Jambos* (L.) Alston in Trimen, Fl. Ceylon (Suppl.) VI, 115 (1931); Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 165. (Fig. 11*b*).

Widely cultivated in the Malay Peninsula and other tropical countries. The Rose Apple or *Jambu Mawar*.

A *bush* or small *tree*. *Twigs* angled or compressed, eventually subterete, drying brown. *Leaves* coriaceous, lanceolate or oblong lanceolate, long tapered to the acuminate apex, base long narrowed, up to c. 20 cm. long and 5 cm. broad, both surfaces drying greenish brown to reddish brown and obscurely pustulate; petiole up to c. 1 cm. long; midrib impressed above, prominent below; *primary nerves* c. 10–15 pairs, 1 cm. or more apart, slightly raised and rather faint above, elevate and distinct below, ascending and curved up to a distinct, shallowly looped sometimes interrupted intramarginal nerve 3–5 mm. from leaf margin, with usually a much fainter loop nearer the margin; secondaries and reticulations raised on both surfaces, often obscure above, distinct below but less prominent than primaries.

Racemes terminal, shorter than leaves, few flowered, the rachis rather stout, 4-angled; *flowers* solitary on pedicels up to c. 1·5 cm. long, fragrant, 7–8 cm. across stamens; *calyx* tube pale greenish or pale yellowish, obconic, c. 1·5 cm. long, c. 1 cm. across mouth (excluding lobes), narrowed to base and slightly contracted into a stout not well defined pseudostalk 2–3 mm. long; lobes 4, persistent, reflexed after anthesis, broadly ovate rounded, somewhat unequal, the 2 larger c. 1 cm. across at base and 6 mm. tall; *petals* 4, white, reflexed after anthesis, orbicular, concave, gland dotted, c. 1·5 cm. diam; *stamens* numerous, filaments slender, terete, up to c. 4 cm. long, cream white, anthers oblong, c. 1·2 mm. long, connective gland small and inconspicuous; *style* stouter than filaments, subulate, c. 3·5–4 cm. long; *ovary* 2-celled, multiovulate.

Fruit very depressed globose, up to c. 6 cm. diam., 3–4 cm. tall, distinctly rose scented, pale orange yellow or greenish yellow tinged pink and flushed pink on one side, surface dull, closely gland dotted; apical umbilicus c. 1–1·75 cm. diam., with the 4 thickened slightly incurved greenish calyx lobes, and style remains; pericarp firm, slightly juicy, pale orange yellow, sweet and slightly astringent, with strong taste of rose water, 1 cm. thick or more; seed 1, lying loosely in centre, depressed globose, c. 2·5 cm. diam., testa thick, brown or white, pithy, closely adhering to the rugose surface of the cotyledons.

13. **Eugenia plumbea** King, Mat. F.M.P., No. 12, 85 (1901); Ridl., F.M.P., I, 727. (Fig. 12*c*).

Perak: Gunong Batu Puteh, 3,400 feet, *Wray 479* (type collection).
Distrib: Endemic.

So far known only from one collection.

A *tree. Twigs* slender, 4-angled, bark dark. *Leaves* thinly coriaceous, lanceolate, acuminate, base cuneate, up to

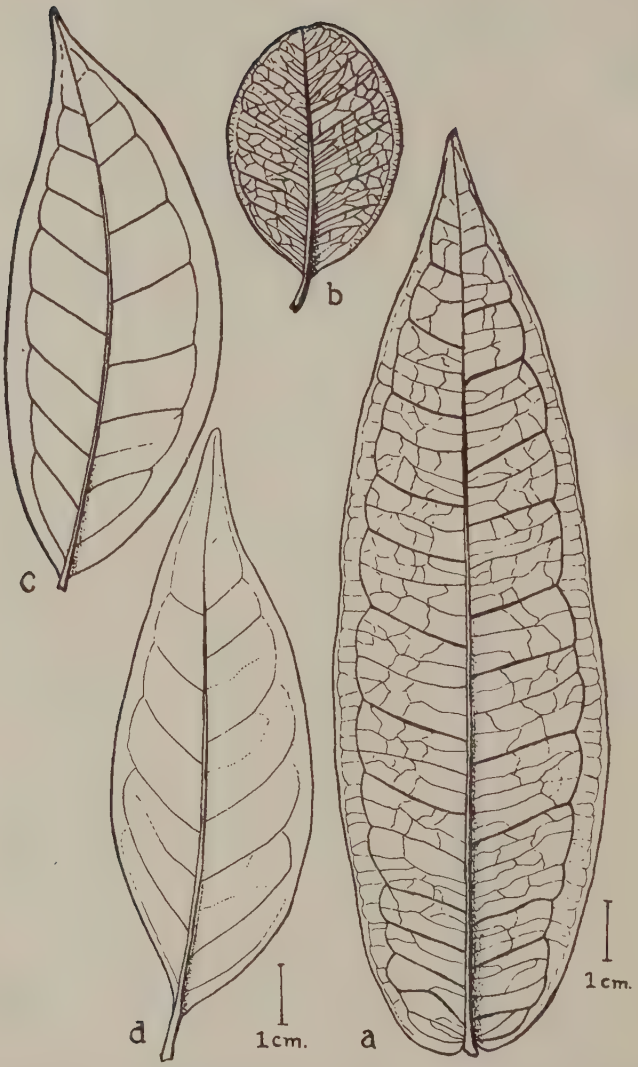
b
c
d
1cm.
a
1cm.

Fig. 12. a, *E. porphyranthera;* b, *E. oreophila;* c, *E. plumbea;* d, *E. Rostadonis.*

c. 10 cm. × 3·5 cm., both surfaces lead colour when dry, the upper shining, the lower dull; *primary nerves* up to 10–12 pairs, impressed above, prominent below, c. 0·5–1 cm. apart, ascending and running straight to a conspicuous intramarginal nerve c. 5 mm. from leaf margin, with a much fainter loop very close to the margin; petiole very short, up to c. 3 mm. long.

Inflorescences terminal or axillary, of shortly pedunculate racemes bearing about 3 flowers. Flowers distinctly pedicellate; *calyx* campanulate, c. 1·6 cm. long, rounded at base; lobes 4, broad and rounded, 4–5 mm. tall; *petals* rotund-reniform, larger than calyx lobes but shorter than stamens. Flowers, including stamens, delicate green (fide Wray). *Fruit* unknown.

14. **Eugenia Rostadonis** Ridl. in Journ. Roy. As. Soc. Str. Br., LXI, 8 (1912); F.M.P., I, 727. (Fig. 12*d*).

TRENGGANU: Bundi, *Rostados s.n.* (type collection).
Distrib: Endemic.

? A *tree.* *Twigs* slender, terete, with smooth brownish bark. *Leaves* thinly coriaceous, lanceolate, up to 10·5 cm. × 3·5 cm., apex acuminate, base cuneate, midrib impressed above in a narrow channel, elevate below; *primary nerves* 6–8 pairs, impressed and obscure above, slender and raised below, c. 1 cm. apart, meeting in a looped intramarginal nerve 2–4 mm. from leaf margin, with another very obscure loop very close to the margin; secondaries and reticulations invisible above, secondaries below very few, reticulations lax, very slender; upper surface drying reddish black, closely and finely punctate, lower surface pale with numerous minute raised darker glands; petiole slender, up to c. 1 cm. long.

Inflorescences terminal or from upper leaf axils, of short cymes of 2–? 5 flowers, peduncle c. 2 mm. long with a pair of small persistent triangular acute bracts c. 1 mm. long; pedicels 3–4 mm. long with a pair of similar bracteoles; *calyx* tube c. 1·2 cm. long, campanulate or funnel shaped, narrowed to a short stout pseudostalk; lobes broadly ovate orbicular, c. 7 mm. wide and 5 mm. tall, apparently more or less persistent; *petals* white (fide Ridley); *stamens* numerous, slender, over 1 cm. long; *style* c. 3·5 cm. long. *Fruit* unknown.

Although only one collection is known of this species, it appears distinct in the lax habit, the leaves drying dark above and pale below, and in the very short, usually terminal inflorescences with persistent bracts and bracteoles. It is allied to *E. porphyranthera* Ridl. and *E. plumbea* King, but very distinct from both in foliage characters.

15. **Eugenia Scortechinii** King, Mat. F.M.P., No. 12, 85 (1901), incl. var. *parvifolia* King; Ridl., F.M.P., I, 725. (Fig. 11*c*).

Not uncommon from Penang to Johore on the west side of the Main Range, in lowland forest. There is one doubtful collection from Singapore, *SFN 5974* (*Burkill*), in which the twigs are rounded.

Distrib: Lower Siam.

A *tree* up to c. 16 metres tall or a *shrub*. Youngest *twigs* strongly 4-angled, winged below nodes, bark smooth and brown, older twigs terete with greyish or brownish bark. *Leaves* lanceolate, ovate lanceolate or ovate oblong, apex acute or acuminate, narrowed to a rounded, more or less cordate base, upper surface drying dark brown to almost black, closely and minutely punctate, lower surface paler, reddish or reddish brown, without visible glands; midrib narrowly impressed above, prominent below; *primary nerves* up to c. 10 pairs, usually c. 1 cm. apart, impressed above, prominent below, ascending and curving gently up to a conspicuous intramarginal nerve c. 5 mm. from leaf margin, with a very faint loop nearer the margin; secondaries and reticulations very faint or invisible above, visible below but faint; petiole 2–3 mm. long.

Inflorescences terminal or from upper axils, very short, almost sessile, rachis c. 1 cm. long or less, *flowers* up to c. 9, sessile or pedicellate, red with yellow centre; *calyx* widely campanulate, 1–1·4 cm. long, abruptly contracted at base into a stout pseudostalk c. 3–4 mm. long, lobes 4, persistent, unequal, broadly ovate rounded, the larger c. 7 mm. across at base and 5 mm. tall; *petals* 4, free, red (fide King), orbicular, thick textured with thin margins, c. 10 mm. diam.; *stamens* numerous, 1 cm. or more long, filaments slender, subulate, anthers oblong, c. 1·5 mm. long, no connective gland visible; *style* slender, c. 3·5 cm. long; *ovary* 2-locular multiovulate. *Fruit* (probably unripe) oblong globose, c. 2 cm. diam., the whole of the apex deeply excavate, fringed with the very short remains of the calyx tube and the hardly enlarged calyx lobes; seeds apparently 2, cotyledons stalked, inner faces folded and excavate, hypocotyle long but not reaching outer surface of seed.

E. Scortechinii King var. **cuneata** var. nov.

A typa foliis basi cuneatis, petiolatis, ramulis plus minusve teretis vel leviter sulcatis differt.

TRENGGANU: Ulu Brang, 1,000 feet, *SFN 33661* (*Moysey & Kiah*).

NEGRI SEMBILAN: Sungai Ujong, *Alvins s.n., 3329.*

SELANGOR: Batu Caves, *Forest Dept. FMS 30791;* Labu river, *Ridley s.n.*

PAHANG: Sungai Cheka, Kuala Lipis, *Forest Dept. FMS 4028,* TYPE collection, holotype in Herb. Singapore.

JOHORE: Kuala Sembrong, *Lake & Kelsall s.n.*

Distrib: Endemic.

16. **Eugenia diospyrifolia** Duthie in Hook. fil., F.B.I., II, 472 (1878). *E. diospyrifolia* Wall. nom nud. *E. nemoricola* Ridl. in Journ. Roy. As. Soc. Str. Br., LXI, 9 (1912); F. M. P., I, 725, sub E. pseudoformosa King. (Fig. 13*a*).

KEDAH: Koh Mai Forest Reserve, *SFN 35207* (*Kiah*); Langkawi, *Haniff s.n.*

KEMAMAN: Bukit Kajang, *Corner s.n.* (leaves only).

PENANG: Richmond Pool, *Ridley s.n.;* Government Hill, 2,400 feet, *Curtis s.n.;* Telok Bahang, *SFN 12685* (*Haniff*).

PAHANG: Kuala Teku, 500 feet, *Seimund 438, 538.*

Distrib: Assam, Burma, Siam, Sumatra.

A small *tree. Branchlets* terete or more or less compressed, smooth, bark brownish or greyish. *Leaves* oblong, lanceolate or narrowly ovate, up to c. 26 cm. × 7 cm., but variable in shape and size, apex acuminate, base slightly narrowed or truncate, or rounded and more or less cordate, upper surface drying brown to black, minutely punctate, lower surface paler with dark gland dots; midrib more or less impressed above, prominent below; *primary nerves* up to c. 15 pairs in largest leaves, 1–3 cm. apart, impressed above and often very inconspicuous, slender but prominent below, ascending and curving gently up to a well marked shallowly looped intramarginal nerve c. 0·5–1 cm. from leaf margin, with a much fainter loop much nearer the margin usually visible; secondaries and reticulations usually faint or obscure above, fine and slightly raised below; petiole short and stout, 5 mm. or less long.

Inflorescence few flowered, terminal, short, usually on a peduncle of variable length, but whole inflorescence not more than c. 4 cm. long; *calyx* up to c. 2 cm. long on a pedicel up to c. 2 cm. long, widely campanulate, narrowed rather abruptly at base to a pseudostalk which may reach almost 1 cm. but is usually shorter, bracts and bracteoles

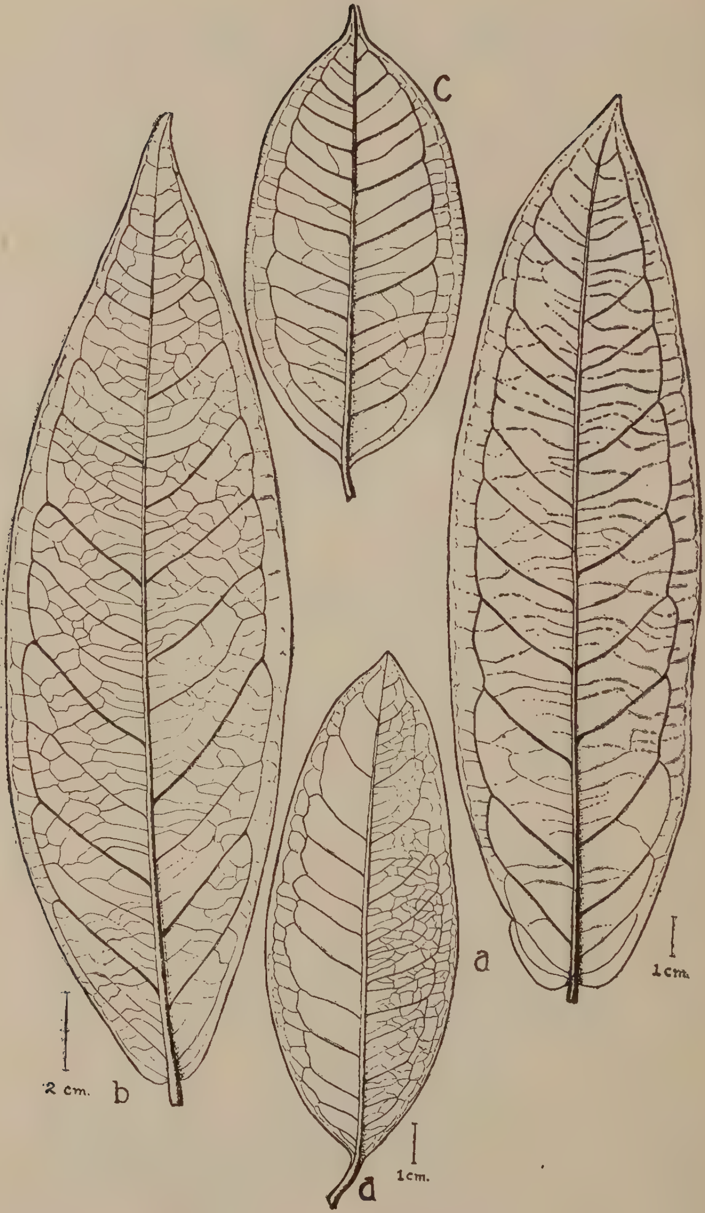
c
a
1cm.
2 cm.
b
1cm.
d

Fig. 13. a, *E. diospyrifolia;* b, *E. pseudoformosa;* c, *E. johorensis;* d, *E. densiflora.*

minute, narrowly ovate, subpersistent, lobes 4, more or less unequal, broadly ovate rounded, the largest nearly 1 cm. across at base and 5 mm. tall; *petals* 4, free, orbicular, glandular pustulate, c. 1 cm. diam.; *stamens* numerous, c. 2 cm. long, filaments very slender, subulate, anthers oblong, c. 1 mm. long, connective gland apparently none; *style* very slender, c. 4 cm. long; *ovary* 2-celled, multiovulate. *Fruit* (probably unripe) very like that of *E. Scortechinii,* but with a more pronounced apical calyx tube.

The plants included here vary greatly in size of leaf. Part may be *E. diospyrifolià* var. *lanceolata* (Korth.) Craib, which I have not seen. Seimund's collections from Kuala Teku have very small oblong lanceolate leaves and may be a riverside variety. The species appears to be a variable one in foliage characters, judging from specimens in Herb. Calcutta named by King and from a long series of specimens included here in Herb. Dehra Dun.

17. **Eugenia pseudoformosa** King, Mat. F.M.P., No. 12, 83 (1901); Ridl., F.M.P., I, 725, pro parte; *E. formosa* King, loc. cit. 80, non Wall. *Syzygium pseudoformosum* (King) Merr. & Perry in Mem. Amer. Acad. Arts & Sci, XVIII, 3, 165 (1939) pro parte. (Fig. 13*b*).

In lowland forest from Perak and S. Trengganu to Singapore, once recorded from Perak at 3,000–4,000 feet. *Distrib:* Lower Siam, Borneo, ? Java.

A *shrub* or small *tree,* bark thin smooth entire, silvery grey, green below surface; wood pale yellowish turning dingy on exposure. *Branchlets* terete, slightly compressed at nodes, bark usually pale. *Leaves* elliptic or oblong elliptic, up to 30 cm. or even more long, and 12–13 cm. broad, apex acuminate, base narrowed, rounded and more or less cordate; upper surface drying olivaceous brown to dark brown, very minutely gland dotted or glandular pustulate, lower surface paler, usually yellowish brown, not visibly glandular; midrib impressed above, prominent below; *primary nerves* up to about 20 pairs, usually c. 14, more or less impressed above, elevate below, widely spaced, ascending, nearly straight or curving gently up to a prominent looped intramarginal nerve 0·5–1 cm. from leaf margin, with a much fainter intramarginal nearer the margin; secondaries few; reticulations lax, distinct below, but much less prominent than primaries; petiole short, c. 0·5 cm. long, thick and corky, drying pale.

Inflorescences terminal, of very shortly peduncled cymes, or the flowers fascicled and rather densely crowded. *Flowers* sessile or nearly so, pink except for white margin of petals; *calyx* narrowly campanulate, glandular pustulate, up to c. 1·8 cm. long and 1 cm. across mouth before anthesis, the base narrowed rather abruptly into a stout conical pseudostalk which is variable in length but may reach c. 6 mm.; lobes 4, broad and rounded, the outer smaller, more or less triangular, the largest nearly 1 cm. across at base and 6–7 mm. tall; *petals* 4, free, broadly obovate-orbicular, gland dotted, c. 1 cm. diam.; *stamens* up to c. 3·5 cm. long, filaments slender, broadened at base, anthers oblong, c. 2·1 mm. long, connective gland not visible; *style* slender, c. 4 cm. long; *ovary* 2–locular, multiovulate. *Fruit* similar to that of *E. Scortechinii,* oblong globose, narrowed at base, the whole apex deeply excavate with the calyx lobes persisting for some time.

Merrill and Perry include here *E. formosa* Koord. and Valet. in Meded. Lands Plantent., XL, 73 (1900); Atlas Baumart. Java, III, figs. 459, 460, but although what Koorders and Valeton describe can hardly be *E. formosa* Wall., I am a little doubtful as to whether it can be included in *E. pseudoformosa* King. The flower buds as figured by Koorders and Valeton are rather different in shape from those of the Malay Peninsular material, the calyx tube being much less narrowed at the base. They are more like the buds of *E. diospyrifolia* but the swollen corky petiole, which is characteristic of *E. pseudoformosa*, and which Koorders and Valeton figure, is not present in *E. diospyrifolia.*

18. **Eugenia tiumanensis** Ridl. In Trans. Linn. Soc., III, 299 (1893); F.M.P., I, 725. (Fig. 14*c*).

PAHANG: Pulau Tioman, *Ridley* (not seen); Joara Bay, Pulau Tioman, *SFN 1043* (*Burkill*)?

"A big *tree. Branches* slender. *Leaves* thin, narrow lanceolate acuminate, 4 in. long, 1 in. wide; petioles 1 in. long, slender. *Flowers* sessile in a terminal head, white. *Calyx* campanulate; lobes large round 0·5 in. long. *Petals* short, oblong, round. *Stamens* 0·5 in. long."—ex Ridley.

This species was described by Ridley from specimens collected by himself in rocky jungle in Pulau Tioman, but no number was quoted in the description. No type specimen, or any specimen written up by Ridley, or collected by him and corresponding to his description can be discovered in the Herbaria at Kew and Singapore, although such specimens, if they exist, should be in Singapore.

Burkill's collection fits the description as far as it goes, except that Ridley describes his plant as a large tree, and Burkill's field note reads "small tree, 15 ft.".

If *SFN 1043* is correctly placed, then *E. tiumanensis* comes very near to *E. Scortechinii* var. *cuneata* and may be only an extreme form of it, but the leaves are much narrower and much more narrowed to apex and base, the petioles are longer and there are slight differences in the venation.

E. pseudoformosa, *E. Scortechinii*, *E. diospyrifolia*, and *E. tiumamensis* are difficult to define in a satisfactory manner, and this appears to be the experience of most botanists who have worked on these and related species. The obscure status of *E. tiumanensis* adds to the difficulty. The following are the main distinguishing points between the four species:—

E. pseudoformosa—Inflorescence and flowers more or less sessile; twigs rounded; leaves broadest about middle, usually large (c. 20 cm. long), base rounded or subcordate.

E. diospyrifolia—Inflorescence peduncled, flowers pedicelled; twigs more or less rounded or compressed or more or less 4-angled; leaves usually broadest near base, base truncate, rounded or subcordate.

E. Scortechinii—Inflorescence and flowers more or less sessile; twigs strongly angled to winged; leaves broadest about middle (c. 15 cm. long or less), base rounded or subcordate, nearly sessile.

E. Scortechinii var. *cuneata*—Inflorescence and flowers more or less sessile; twigs rounded or slightly angled; leaves broadest about middle (15 cm. long or less), base cuneate, petiolate.

E. tiumanensis—Inflorescence and flowers more or less sessile; twigs rounded; leaves narrow lanceolate, long narrowed to apex and base, petiolate.

19. **Eugenia pendens** Duthie in Hook. fil., F.B.I., II, 475 (1878); King, Mat. F.M.P., No. 12, 94; Ridl., F.M.P., I, 726. (Fig. 14*a*).

An endemic species not uncommon in lowland forest from Perak and Kelantan to Singapore.

A small *tree*. *Twigs* slender, terete, more or less compressed at nodes, smooth, bark brownish. *Leaves* thinly coriaceous, elliptic, oblong elliptic to ovate lanceolate, up to c. 22 cm. × 9 cm., but usually smaller, apex acuminate, sometimes abruptly, acumen blunt or acute, base cuneate; upper surface drying olivaceous or brownish, minutely punctate, lower surface greenish, gland dotted; midrib shallowly impressed above, prominent below; *primary nerves* 10–15 pairs, usually c. 1 cm. apart, impressed above, elevate below and rather slender, ascending and curving to a looped intramarginal nerve 4–6 mm. from leaf margin, with another very fine loop nearer the margin; reticulations very fine above and raised, visible only under a lens, fine, raised and lax below; petiole up to c. 1 cm. long.

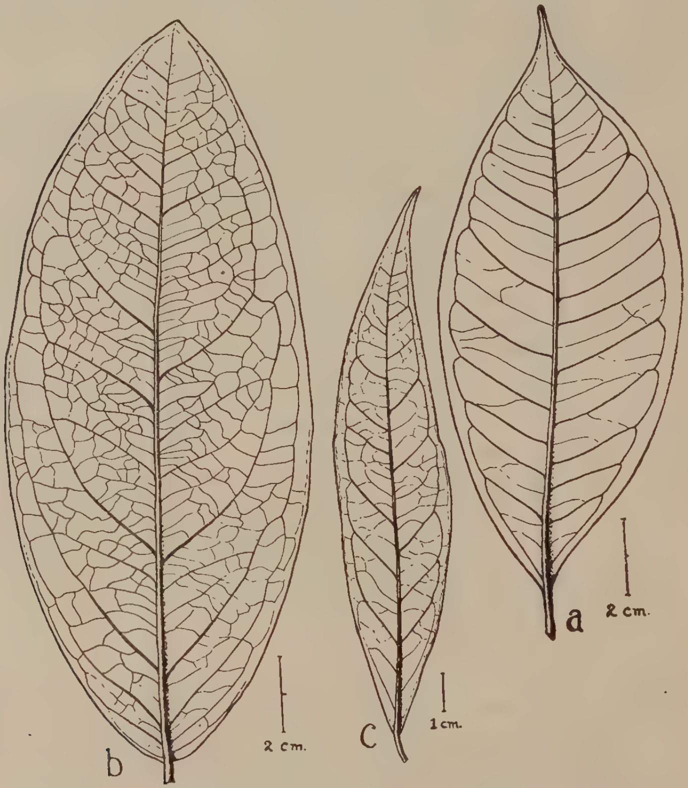

Fig. 14. a, *E. pendens;* b, *E. javanica;* c, *E. ? tiumanensis* (SFN 1043).

Inflorescences terminal or occasionally axillary, on a variable peduncle up to c. 1 cm. long, the inflorescence rachis not more than about 2 cm. long. *Flowers* about 5–6 on very variable bright green pedicels up to c. 2·5 cm. long; *calyx* funnel shaped or more or less campanulate, c. 1 cm. long, the tube very pale yellow flushed pink, the lobes pale greenish yellow flushed pink, narrowed at base and rather abruptly contracted into a pseudostalk varying from 3–4 mm. to almost none; lobes 4, persistent, spreading, unequal, very broad, the larger c. 1 cm. across and 4–5 mm. tall; *petals* 4, free, quickly deciduous, gland dotted, orbicular, c. 1 cm. diam.; *stamens* numerous, up to 1·3 cm. long, filaments slender, anthers less than 1 mm. long, connective gland very inconspicuous; *style* stouter than filaments and about equal to them in length. *Fruit* depressed globose, green flushed red (?unripe), c. 2·5 cm. diam., with obscure vertical ridges when dry, apical excavation wide and shallow, c. 1·2 cm. diam., fringed by the very short calyx tube and persistent reflexed calyx lobes.

Many specimens have been wrongly accredited to this species in Herb. Singapore. In Herb. Kew is a sheet of *Scortechini 2021* determined as this species by King and later queried in an unknown hand. It is *E. virens* Koord. and Valet. Perhaps this sheet is the basis of King's remark in the "Materials" that *E. pendens* is allied to *E. densiflora*, for *E. virens* is much more similar, superficially, to *E. densiflora* than to *E. pendens*.

20. **Eugenia johorensis** Ridl. in Journ. Roy. As. Soc. Str. Br., LXI, 8 (1912); F.M.P., I, 725. (Fig. 13*c*).

JOHORE: Gunong Pulai, *Ridley's collector s.n.*, dated 1892 (type collection).

A *tree* (fide Ridley). Older *twigs* terete with brown flaky bark, youngest parts 4-angled with narrow wings on the angles, smooth. *Leaves* elliptic or elliptic oblong, up to c. 13 cm. long and 5·5 cm. broad, apex shortly acuminate, acute, base broadly cuneate-rounded, abruptly narrowed on to the petiole; petiole 1 cm. long or a little less; midrib lightly impressed above, elevate below; *primary nerves* 8 or 9 pairs, 1 cm. apart, faint and slightly raised above, elevate below, slender but bold, meeting in a shallowly looped intramarginal nerve 5–8 mm. from leaf margin with a much finer intramarginal 1·5–2 mm. from margin; secondaries and reticulations faint and slightly raised above, the secondaries below almost as conspicuous as the primaries, the reticulations fainter; both surfaces drying brownish, not gland dotted.

Flowers terminal (?or also from upper leaf axils), in pairs, on very short pedicels c. 3 mm. long, apparently bearing minute subpersistent bracts and bracteoles; *calyx* tube, including pseudostalk, c. 2 cm. long, broadly campanulate and abruptly narrowed to a slender pseudostalk 6–8 mm. long: lobes broad, rounded, unequal, ?subpersistent; *petals* large, rounded; *stamens* numerous, c. 2 cm. long; *style* c. 2·5 cm. long. *Fruit* unknown.

Only one sheet is known of this species. It bears two mature flowers and two buds. It seems curious that this species, which must be a conspicuous one with its large flowers, has never been met with again.

21. **Eugenia javanica** Lamk., Encycl., III, 200 (1789); Duthie in Hook. fil., F.B.I., II, 474; King, Mat. F.M.P., No. 12, 81; Gagnep. in Fl. Gen. Indo-Ch., II, 837; Koord. & Valet., Atlas Baumart. Java, III, fig. 452; Ridl., F.M.P., I, 726; Corner, Wayside Trees of Malaya, p. 499. *Myrtus samarangensis* Bl., Bijdr., 1084 (1826). *Syzygium samarangense* (Bl.) Merr. & Perry in Journ. Arn. Arb., XIX, 115 (1938). (Fig. 14*b*).

Wild usually near the sea and cultivated in a number of varieties. Some of the Malay names are: *Jambu Ayer, Jambu Puteh, Jambu Ayer Mawar, Jambu Ayer Rhio, Jambu Ayer Patah Raja.*

Distrib: Lower Burma, Andamans, Nicobars, to Java.

A small to medium sized *tree,* massive when old. *Twigs* rather slender, terete, the youngest green the older with smooth brown bark. *Leaves* coriaceous or thinly coriaceous, broadly oblong, elliptic oblong, elliptic lanceolate or elliptic, occasionally narrowly ovate, apex acute or subacute, base slightly narrowed, rounded and sometimes slightly cordate, up to c. 25 cm. × 10 cm., but variable in size, rather dull dark green above, paler below, usually drying pale reddish brown, in life with minute scattered pellucid gland dots, often black dotted below when dry; midrib channelled above, elevate and rather broad below; *primary nerves* up to c. 12 pairs, spreading-ascending, raised on both surfaces but not very prominent, sometimes channelled above when dry, meeting in a looped intramarginal nerve c. 5–10 mm. from margin with another series of fainter loops nearer the margin; secondaries and reticulations rather obscure in life, distinct when dry but less prominent than primaries; petiole 5 mm. or less long.

Inflorescences axillary or terminal, 5–10 cm. long and broad, on peduncles up to c. 3 cm. long, or almost sessile; *flowers* white, in threes, twos or solitary at the ends of the two or three pairs of slender, spreading, distant branches up to c. 3 cm. long, the rachis and branches green; flowers sessile or on pedicels up to c. 1 cm. long; *calyx* pale green, obovoid, c. 1·4–1·5 cm. long, c. 1·5 cm. across, narrowed at base into a short stout pseudostalk; lobes 4, somewhat unequal, transversely oblong, rounded, concave, c. 1 cm. across at base and 4–5 mm. tall, persistent; *petals* 4, white with inconspicuous brownish gland dots, obovate orbicular, shortly and broadly clawed, c. 1·2–1·5 cm. long; *stamens* numerous, filaments white or pale greenish white, slender, terete, the longest up to c. 2·5 cm., anthers oblong, c. 1·5 mm. long, connective gland small and inconspicuous; *style* stouter than filaments, c. 3 cm. long; *ovary* 2-celled, multiovulate.

Fruit greenish or whitish or red when ripe, shining and of a waxy appearance, slightly ribbed, broadly obconic or pyriform or somewhat turbinate, usually c. 4–6 cm. long and broad, but often much larger in cultivation, apex widely excavate, bearing the much enlarged, fleshy, incurved calyx lobes; pericarp very thick, white, spongy, slightly juicy, seeds 1–2 lying loosely in a cavity in the centre, irregularly globose or hemispherical, 1·2–1·5 cm. diam., testa white, thick and pithy, adhering closely to cotyledons; structure of cotyledons very similar to that of *E. malaccensis* and *E. aquea.*

22. **Eugenia pseudomollis** nom. nov.

E. mollis King, Mat. F.M.P., No. 12, 86 (1901); Ridl., F.M.P., I, 728; non Willd. ex Berg. (1854). (Fig. 15*a*).

PERAK: Larut, within 300 feet, *Kunstler 2686, 2808* (syntypes), within 100 feet, *Kunstler 5572* (syntype); Taiping, *Wray 2372* (syntype), within 100 feet, *Kunstler 8387* (syntype).

Distrib: Sumatra.

A small *tree* or *shrub*. *Twigs* slender, slightly 4-angled or terete and compressed at nodes, pale brown, bark faintly papillate, with a covering of very short coarse brown hairs. *Leaves* thinly coriaceous, oblong lanceolate, apex acuminate to a narrow acute acumen, base slightly narrowed, rounded and subcordate, up to c. 28 cm. × 6·5 cm., upper surface drying olivaceous brown, minutely punctate, glabrous, lower surface darker, minutely and closely glandular pustulate, clothed with short stiff coarse brown hairs; midrib impressed above, prominent below and rounded; *primary nerves* 25–30 pairs, fine and slightly raised above, slender but prominent below, 1–2 cm. apart, ascending and running straight or very slightly curved to a very shallowly looped intramarginal nerve c. 3–5 mm. from leaf margin; secondaries and reticulations very fine and almost invisible above, except under a lens, slightly more pronounced below, the few secondaries fairly distinct, sometimes almost as prominent as primaries; petiole stout, 3–5 mm. long.

Inflorescences in lax terminal panicles up to c. 21 cm. long, peduncle up to c. 5 cm., compressed and obscurely 4-angled like the branchlets of the inflorescence and covered with the same coarse indumentum as the twigs and under surfaces of the leaves; branchlets in distant pairs, c. 5–6 cm. apart, the lower pair almost horizontal, c. 5–6 cm. long, the

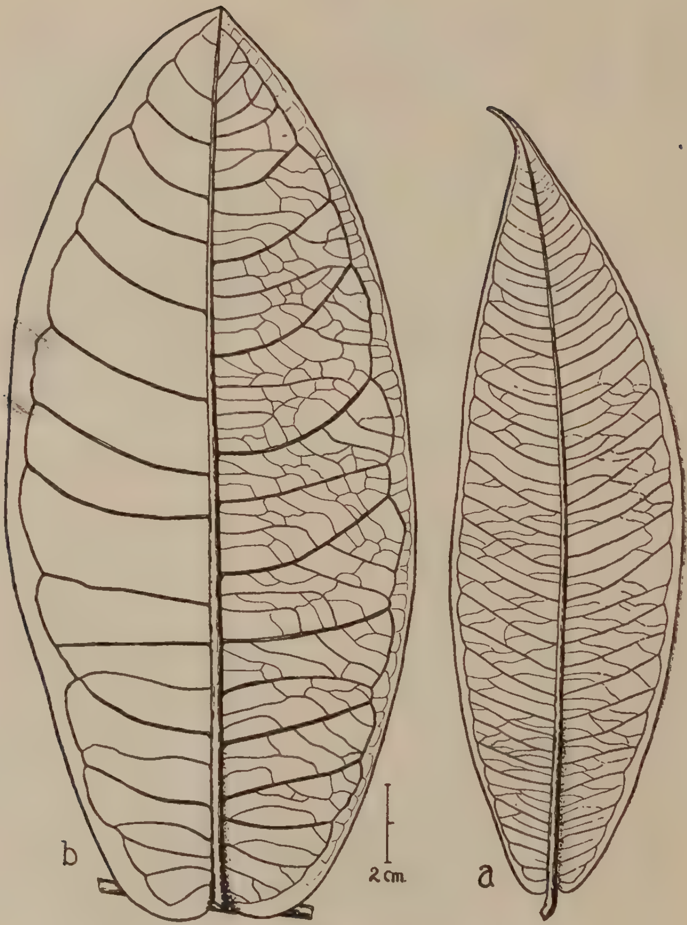

Fig. 15. a, *E. pseudomollis;* b, *E. papillosa.*

upper two pairs shorter and more ascending; *flowers* numerous, not crowded, usually in threes at the ends of short secondary or tertiary branchlets, these branchlets often subtended by a solitary flower or a pair of flowers; flowers white (fide Wray and Kunstler); pedicel variable, from 1–5 mm.; *calyx* c. 1 cm. long, the tube scurfy, funnel shaped, tapering quickly from below lobes to a short rather obscure pseudostalk c. 1·5 mm. long; lobes 4, unequal, broadly ovate rounded, the largest c. 4 mm. across and

3 mm. tall; *petals* 4, free, orbicular, c. 7–8 mm. diam., gland dotted; *stamens* numerous; *ovary* 2-celled, multiovulate. *Fruit* (ex King) ovoid globose, c. 1·5 cm. diam., crowned by the cupular calyx and covered with deciduous scurf-like hairs.

A species easily recognised by the short thick brown hairs on the branches and undersurfaces of the leaves, and the scurfy indumentum of the inflorescence and calyx tube.

23. **Eugenia papillosa** Duthie in Hook. fil., F.B.I., II, 495 (1878); King, Mat. F.M.P., No. 12, 84; Ridley, F.M.P., I, 730; Corner, Wayside Trees of Malaya, p. 501; *Syzygium papillosum* (Duthie) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 157 (1939). (Fig. 15*b*).

Not uncommon in lowland forest, often in fresh water swamp forest, from Perak to Singapore.
Distrib: Borneo.

A tall *tree*, base of trunk often with strongly arcuate and branched stilt roots; bark thickly papery flaky, bright orange rufous, bright green immediately below surface even in oldest trunks; inner bark pallid. *Branchlets* stout, terete, brown to dark brown, the youngest scurfy. *Leaves* coriaceous, obovate oblong, or elliptic oblong, or oblong lanceolate, up to c. 35 cm. × 15 cm., apex subacute or blunt, base slightly narrowed, cordate auriculate, subamplexicaul; upper surface drying blackish brown, smooth, not, or very sparsely punctate, lower surface brownish or reddish, glandular, sparsely scurfy when young; midrib impressed above, prominent and rounded below; *primary nerves* up to about 20 pairs, impressed or slightly raised above and very slender, very prominent below, 1–3 cm. apart, arising almost at right angles to the midrib and curving up to a prominent looped intramarginal nerve c. 3–10 mm. from leaf margin, a much fainter loop much nearer and usually hidden by the strongly recurved margin; reticulations faint or obscure above, lax and well marked below but much less prominent than primaries; petiole very short and thick, the leaves appearing sessile.

Inflorescences panicled, several together, terminal or from the upper axils, shorter than leaves, reaching 15–18 cm., but variable in length; peduncles, rachis and branchlets rather stout but thinner than twigs, more or less compressed, scurfy like the vegetative branchlets; branchlets ascending or divaricate; *flowers* sessile, fragrant, yellowish green or almost white, crowded in bracteate heads at the ends of the short ultimate branchlets, each flower subtended by two subpersistent lanceolate bracts c. 5 mm. long, with broader ovate bracts at the base of the head; *calyx* c. 1 cm.

long, funnel shaped or narrowly campanulate, slightly constricted below lobes, narrowed to a rather stout pseudostalk c. 5 mm. long, lobes 4, unequal, broadly triangular, blunt, c. 2–3 mm. tall, reflexed after anthesis; *petals* 4, free, quickly deciduous, orbicular, shortly clawed, conspicuously veined, c. 6–7 mm. diam.; *stamens* numerous, up to c. 1·6 cm. long, filaments slender, subulate, anther oblong elliptic, less than 1 mm. long, with a brownish connective gland; *style* stouter than filaments, c. 1·3 cm. long; *ovary* 2-celled. *Fruit* globular, c. 2·5 cm. diam., pale green.

A conspicuous and well marked species of lowland swampy forest, with its orange papery flaky bark, large almost sessile amplexicaul leaves and bracteate heads of flowers.

24. **Eugenia densiflora** (Bl.) Miquel, Anal. Bot. Ind., I, 17 (1850); DC., Prodr. III, 287 (1828) in syn.; Duthie in Hook. fil., F.B.I., II, 473; King, Mat. F.M.P., No. 12, 84; Ridl., F.M.P., I, 728; Koord. & Valet., Atlas Baumart. Java, III, figs. 446, 447; Corner, Wayside Trees of Malaya, p. 497, fig. 168. *Myrtus densiflora* Bl., Bijdr., 1087 (1826). *Jambosa densiflora* DC., Prodr., III, 287 (1828) [De Candolle here publishes in synonymy "Eugenia densiflora Bl." Whether this is to be regarded as an alternative name or whether it has no nomenclatorial standing is not clear. De Candolle does not quote Myrtus densiflora Bl., but he does give the page reference to the Bijdragen. It would appear that Miquel's is the earliest valid transfer to Eugenia]. *Syzygium pycnanthum* Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 168 (1939). (Fig. 13*d*).

Common in lowland forest and on seashores from Penang and Trengganu to Singapore, and once recorded from forest at 3,000 feet in Perak.

Distrib: Siam, Sumatra, Borneo, Java.

A *tree* up to c. 16 metres tall, or *shrubby*. *Bark* rather variable; trees in open—bark scaly in large thin angular pieces, not fissured or rugose, greyish pinkish brown, dark, inner bark pale pinkish brownish; trees in shade—bark smooth, entire, pinkish greyish, pale; young trees—bark thinly and finely papery flaky, scaling in small pieces, pale greyish white; inner bark green immediately below surface, then pinkish. *Branchlets* stout, terete or slightly compressed, with reddish or brownish striate or rather flaky bark. *Leaves* coriaceous, rather variable in shape and size, usually elliptic oblong, or ovate oblong or even lanceolate, up to c. 28 cm. × 10 cm., apex acuminate, base cuneate or broad and narrowed abruptly to the petiole, upper surface drying olivaceous, brown or reddish brown, usually closely and minutely punctate or glandular pustulate, lower surface pale brown or reddish brown, more or less black gland dotted; midrib impressed above, prominent and rounded below; *primary nerves* up to c. 20 pairs, usually 1–2 cm. apart, slender but raised and distinct on both surfaces, ascending and curving gently up to a distinct looped intramarginal nerve which is sometimes as much as 2 cm. from leaf margin but more usually 7–10 mm., with a slightly less marked but still distinct series of loops 3–4 mm. from margin, and a third faint series very close to the margin; in some leaves there may be 4 intramarginal veins, but the two inner ones are nearly always present and distinct; secondaries and reticulations raised on both surfaces, distinct, but less prominent than primaries and easily distinguishable from them; petiole usually rather stout, wrinkled, up to c. 1 cm. long.

Panicles terminal, short and dense, up to c. 15 cm. across, usually almost sessile, but sometimes on peduncles c. 2 cm. long, much branched, the branchlets stout, more or less compressed, with wrinkled or striate brown or reddish bark; *flowers* sessile or shortly pedicellate, white or rose pink, up to c. 5 cm. across when expanded; *calyx* c. 1·5 cm. long, tube funnel shaped, tapered from below lobes, striate when dry, slightly narrowed at base into an obscure pseudostalk 1–2 mm. long; lobes 4, unequal, broad and rounded, the two inner larger with thin margins, c. 8–10 mm. across and 5–7 mm. tall; *petals* 4, free, orbicular with broad base, c. 1·5 cm. diam., gland dotted; *stamens* numerous, up to c. 5 cm. long, filaments slender, flattened below, subulate above, anthers oblong, c. 1·5 mm. long, connective gland not visible; *style* c. 5 cm. long, a little stouter than filaments; *ovary* 2–celled, multiovulate. *Fruit* globose, c. 2–3 cm. diam., pinkish to purple, apical excavation shallow, c. 0·5–1 cm. diam., fringed with the persistent enlarged erect sepals.

E. densiflora Miq., var. **angustifolia** Ridl., F.M.P., I, 729 (1922); Corner, Wayside Trees of Malaya, p. 497. *E. Foxworthyi* Ridl., F.M.P., I, 728 (1922) non Elmer (1912). *E. Foxworthiana* Ridl., F.M.P., V (Suppl.), 308 (1925). *Syzygium Foxworthianum* (Ridl.) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 168 (1939).

Common on riverbanks in the lowlands in Patani, Upper Perak, Kelantan and Pahang.
Distrib.: Lower Siam, Borneo, Java (fide Ridley).

Differs from the typical form in being a bushy small tree of river banks, with smaller narrower leaves with the venation less prominent, especially above, with usually only one intramarginal nerve which is much closer to the leaf margin; and in the laxer inflorescence with usually long pedicelled flowers.

Fruit globular or more or less depressed globular, 1·5–2 cm. diam., crowned by the erect very conspicuous calyx lobes as much as 6 mm. high; pericarp fleshy, soft, 3–5 mm. thick, inner layer fibrous; seed c. 1 cm. diam., testa rather thin, closely adhering to the cotyledons; cotyledons side by side or oblique, dark coloured, slightly unequal, hypocotyle nearly central, plumule rather large and conspicuous, cotyledons sessile, the inner faces nearly plane except for a ridge and depression to one side of the plumule.

25. **Eugenia rhomboidea** Ridl. in Journ. F.M.S. Mus., V, 33 (1913–14); F.M.P., I, 753. (Fig. 16*a*, *b*, *c*).

SELANGOR: Gunong Mengkuang, 5,000 feet, *Robinson s.n.* (type collection).

Leaf specimens collected on the summit of Gunong Belumut, Johore (*Holttum 3*) may also be this species.

Distrib: Endemic.

A mountain *shrub*. *Branchlets* slender, terete or obscurely 4-angled with dark longitudinally wrinkled bark. *Leaves* rather thick, narrowly obovate or rhomboid, apex acuminate, often shortly and abruptly, base long narrowed on to petiole, 4 cm. × 1·5 cm. to 5 cm. × 3 cm.; upper surface drying brownish, somewhat polished, minutely punctate, lower surface paler, dull, copiously black dotted; midrib impressed above, not raised below except at base where it is slightly keeled; *primary nerves* numerous and close together, slightly raised above but obscure, invisible or very obscure below; petiole up to c. 5 mm. long, wrinkled.

Inflorescences terminal, panicled, up to c. 3 cm. long, with about 2 pairs of short branchlets, angled, bark dark and wrinkled. *Flowers* in threes at branchlet ends, sessile; *calyx* 9–10 mm. long, grey and wrinkled when dry, c. 5 mm. across mouth after anthesis, more or less funnel shaped, tapering to base without definite pseudostalk; lobes 4, small, broadly ovate triangular, c. 2–3 mm. across and 1 mm. tall; *petals* apparently 4, with one free and the others falling as a thick calyptra, the free petal transversely oblong orbicular, thick textured, a little more than 3 mm. across and 2 mm. tall; *stamens* many, up to c. 4·5 mm. long, filaments subulate, stout at base, tapering upwards, anthers transversely oblong; *style* very stout, c. 5 mm. long; *ovary* 2-celled below, 3-celled above. *Fruit* unknown.

Distinct in this group in the small obovate or rhomboid leaves usually with the apex abruptly acuminate, and in the narrow rugose calyx with very small lobes, rather short stout stamens and the very stout short style.

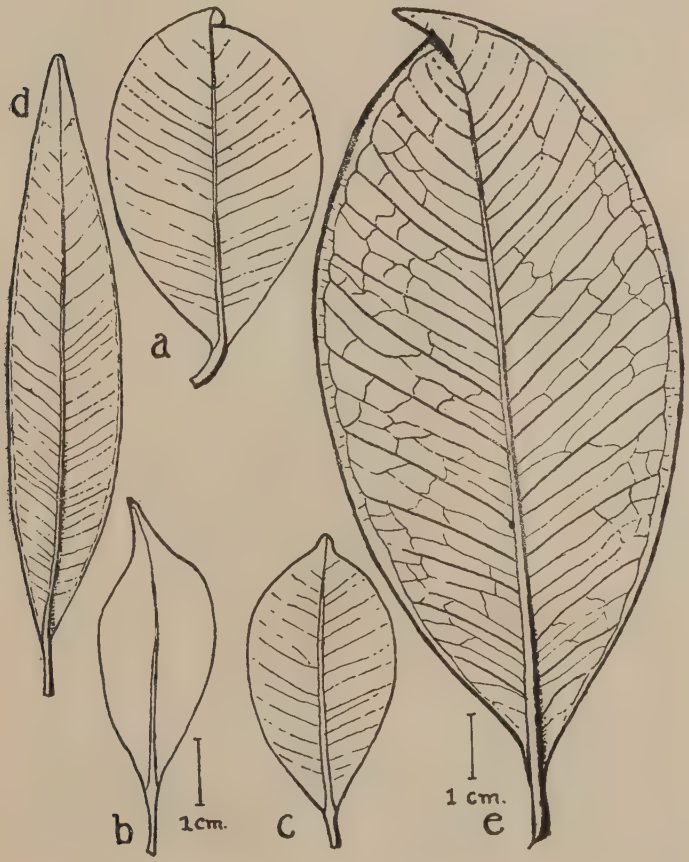

Fig. 16. a, b, c, *E. rhomboidea;* d, *E. salictoides;* e, *E. selangorensis.*

26. **Eugenia salictoides** Ridl. in Journ. Roy. As. Soc. Str. Br., LXVIII, 12 (1915); F.M.P., I, 728. (Fig. 16*d*).

PAHANG: Tahan river banks, *Ridley 2647, 16396;* Sungai Tahan, *SFN 20546 (Holttum), Corner s.n., Forest Dept. FMS 42944;* Sungai Teku, *Seimund s.n.*

Distrib: Endemic.

A *bush,* bark smooth, pale grey or pale brown with dark irregular lines, creviced. *Twigs* terete, smooth, with brownish or greyish creviced bark. *Leaves* narrow lanceolate, coriaceous, willow-like, up to c. 12 cm. long and 1·6 cm. wide, apex acuminate, blunt or subacute, base long tapered, petiole dark coloured, wrinkled, c. 5 mm. long; midrib impressed above, prominent and more or less keeled below; *primary nerves* up to c. 40 pairs, impressed above, faint and inconspicuous, elevate and very fine below, 2–3 mm. apart, but irregular in spacing, meeting in a fine intramarginal nerve less than 1 mm. from leaf margin; secondaries and reticulations practically invisible above, the secondaries below difficult to distinguish from primaries, the reticulations a little fainter; upper surface drying almost black, minutely punctate, lower surface dark brown, sometimes minutely black punctate, sometimes more or less pustulate.

Panicles terminal or from upper leaf axils, up to c. 10 cm. long, peduncle slender, variable in length, usually c. 2–3 cm., bark often pustulate, branchlets slender, 1–2 cm. or sometimes longer, bearing at their apices 3 flowers, either all sessile or the outers on exceedingly short pedicels less than 1 mm. long, with very minute and obscure broad blunt bracts; mature flower buds narrowly pyriform, c. 1 cm. long, the opened *calyx* narrowly campanulate, gland dotted, tapering into a slender pseudostalk c. 3–5 mm. long, lobes 4, semi-orbicular, gland dotted, eventually reflexed, persistent; *petals* 4, free, gland dotted; *stamens* numerous, up to c. 1·6 cm. long, style as long.

Fruit globose, up to c. 1 cm. diam., crowned by a very short calyx rim and the persistent calyx lobes, pericarp almost black and finely longitudinally wrinkled when dry, thin; testa brownish, rather thick and pithy, stripping with pericarp; seed globose, c. 7–8 mm. diam., cotyledons nearly equal, pustulate, inner faces also pustulate, slightly concave; cotyledons sessile, attached to hypocotyle near periphery of seed, radicle and plumule small.

A riverside bush which might almost be regarded as the extremest form of *E. densiflora* var. *angustifolia.* Easily recognised in this group by the very narrow leaves and long stamens.

27. **Eugenia garcinifolia** King, Mat. F.M.P., No. 12, 90 (1901); Ridl., F.M.P., I, 730. *Syzygium garcinifolium* (King) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 167 (1939). (Fig. 17*a*).

PERAK: Larut, 300–500 feet, *Kunstler 6974;* Gopeng, 500–1,000 feet, *Kunstler 4541.*
JOHORE: 3rd mile Mawai-Jemaluang road, *SFN 31469* (*Corner*).
Distrib: Sumatra, Borneo.

A *tree* up to c. 30 m. tall with sharp thin spreading buttresses to c. 2·5 m.; bark light buff grey, rather lenticellate-pustular, scaly with oblong angular pieces, not fissured; inner bark pinkish brown, heart wood red brown.

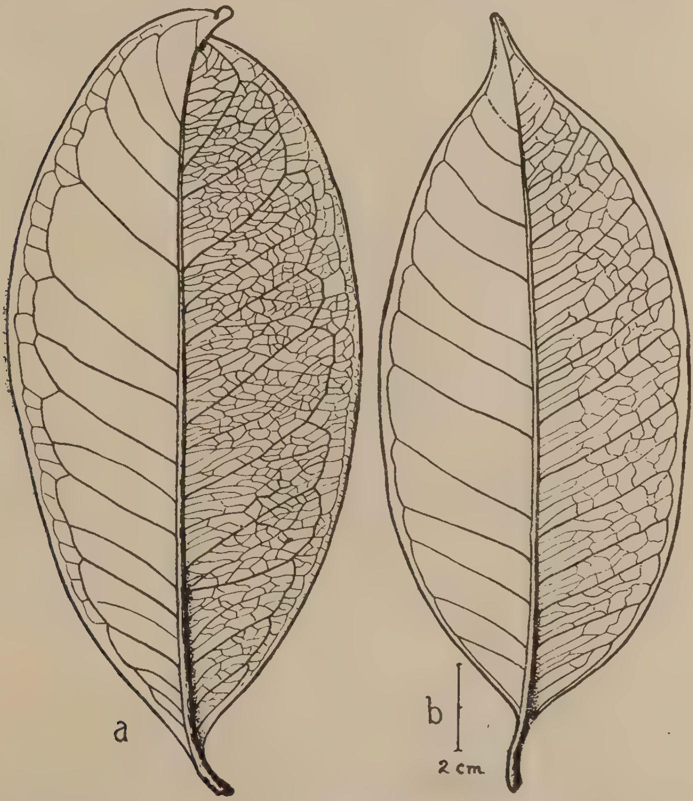

Fig. 17. a, *E. garcinifolia;* b, *E. palembanica.*

Twigs stout, angled, bark smooth, pale brown. *Leaves* thickly coriaceous, elliptic or elliptic oblong, with a tendency to be obovate, from c. 13 cm. × 5 cm. to 20 cm. × 10 cm., apex abruptly and shortly acute or acuminate, base narrowed, margins recurved when dry; upper surface drying greenish brown or pale brown, black dotted or glandular pustulate, lower surface dull, brownish or yellowish green, minutely gland dotted; midrib deeply impressed above, prominent below, longitudinally wrinkled; *primary nerves* up to c. 12 pairs, raised above, rather prominent below, ascending, curving up and interarching to form a looped sometimes rather irregular intramarginal nerve 5–10 mm. from leaf margin, with another quite distinct series of arches closer to the margin; secondaries and close reticulations raised above and below and very distinct, but distinguishable from primaries; petiole channelled above, drying black and wrinkled, 1·5–2·5 cm. long.

Panicles terminal, c. 7 cm. long and about the same across, the rachis stout but thinner than twigs, strongly angled, striate; branchlets spreading, up to c. 2 cm. long, compressed and striate, pale brown or brown; *flowers* white, borne singly on stout pedicels 2–5 mm. long, bracts minute, subpersistent, broadly ovate triangular reflexed; *calyx* c. 1·5 cm. long, narrowly cylindric campanulate, narrowed at base into an obscure very stout pseudostalk c. 2–3 mm. long; lobes 4, unequal, spreading, persistent, broad and rounded, the larger inner ones c. 7 mm. across at base and 4 mm. tall, with thin margins; *petals* 4, free, persisting until after flower is fully expanded, orbicular with a short broad oblong claw, c. 1 cm. diam., gland dotted; *stamens* numerous, up to c. 3 cm. long, filaments very slender, broadened at base, anthers narrowly oblong, 1 mm. long, connective gland inconspicuous; *style* much stouter than filaments and about the same length.

Fruit (? unripe) globular ovoid, c. 1 cm. diam., apical excavation 3–4 mm. diam., fringed by the 4 hardly enlarged erect sepals.

A distinct species by reason of its large size, large thick leaves with well marked reticulation on both surfaces and the large flowers with narrow calyx tube.

28. **Eugenia selangorensis** Ridl. in Journ. F.M.S. Mus., V, 32 (1915); F.M.P., I, 730. (Fig. 16*e*).

SELANGOR: Gunong Mengkuang, 5,000 feet, *Robinson s.n.* (type collection).

A *tree,* (fide Ridley). *Twigs* stout, terete, bark brownish. *Leaves* very coriaceous, elliptic, up to c. 12 cm. × 6 cm., apex shortly and abruptly acuminate, deflexed, base narrowed, upper surface drying brownish, not punctate, lower surface blackish, closely covered with very minute white glistening glands; midrib deeply impressed above, prominent below and more or less keeled; *primary nerves* 15–20 pairs, 3–7 mm. apart, fine and impressed above, slender and slightly elevate below, ascending and curving up to a slender intramarginal nerve 2–3 mm. from the recurved leaf margin, with a very obscure series of arches nearer the margin; secondaries almost as distinct as primaries, impressed above, elevate below, reticulations raised and just visible above, more distinct below, lax; petiole rather stout, c. 1 cm. long, the leaf blade decurrent upon it.

Panicles terminal, c. 4 cm. long, sessile or on a very stout greyish peduncle c. 1 cm. long, branchlets short, very stout, compressed, bark grey, wrinkled and often pustulate; *flowers* sessile, in threes at ends of the secondary branchlets or on exceedingly short tertiary branchlets; *calyx* in mature bud c. 1 cm. long, broadly funnel shaped, narrowed to a short thick ribbed pseudostalk; lobes 4, very unequal, broad and rounded, the inner larger ones c. 6 mm. across and 3 mm. tall; *petals* 4, free, transversely oblong ovate, c. 7 mm. across and 4 mm. tall, persisting until after flower is fully open; *stamens* numerous, up to c. 1·5 cm. long, filaments slender, anthers ovate globose, c. 0·5 mm. long, connective gland small and inconspicuous; *style* stouter than filaments and shorter than them; *ovary* 2-celled. *Fruit* unknown.

This species is known from only one collection and may be no more than a mountain variety of *E. palembanica*, differing in the somewhat narrower and thicker leaves and the much shorter inflorescence with much stouter branches, and a less well marked pseudostalk.

There are in Herb. Singapore a few collections from elevations of 4,500–5,000 feet which seem to be intermediate between *E. selangorensis* and *E. palembanica*. These are:

PERAK: Gunong Bubu, 5,000 feet, *Wray 3907*, 4,500 feet, *Wray 3908, 3914;* Gunong Batu Puteh, 4,500 feet, *Wray 415.*

PAHANG: Pinetree Hill, Fraser Hill, 4,800 feet, *SFN 8535* (*Burkill & Holttum*).

29. **Eugenia palembanica** (Miq.) Merr. in Journ. Roy. As. Soc. Str. Br., LXXVII, 225 (1917); Corner, Wayside Trees of Malaya, p. 500, fig. 168. *Syzygium palembanicum* Miq., Fl. Ind. Bat., Suppl. I, 313 (1860). *Eugenia lepidocarpa* Kurz in Journ. As. Soc. Beng., XLVI, ii, 68 (1877); Duthie in Hook. fil., F.B.I., II, 476; King, Mat. F.M.P., No. 12, 89; Ridl., F.M.P., I,

730; Wall. Cat. 3618, nom. nud. *E. grandis* var. *lepidocarpa* Kurz., For. Fl. Burma, I, 490 (1877). (Fig. 17*b*).

Common in lowland forest, up to about 2,000 feet, and on sandy seashores from Trengganu to Singapore, but not recorded from Perak or further north on the west coast.
Distrib: Burma, Sumatra, Borneo.

A *tree* up to c. 15 m. tall; usually without buttresses or stilt roots; bark dull rufous fawn or pinkish brown, finely reticulately fissured with elongate meshes, not or scarcely flaky; inner bark fairly thick, stripping easily, deep purple brown. *Twigs* usually rather stout, terete, with smooth or slightly flaky greyish or brownish bark. *Leaves* coriaceous, ovate oblong, elliptic, elliptic oblong, occasionally more or less ovate, occasionally lanceolate, rarely obovate oblong, from c. 7 cm. × 3 cm. to 17 cm. × 11 cm., apex blunt or subacute or with a short abrupt point, base cuneate, or rounded and abruptly and shortly narrowed on to petiole; upper surface somewhat polished, drying olivaceous brown to black, usually very minutely and closely punctate, lower surface dull, usually darker than the upper, closely covered with very minute whitish glistening scale-like glands; midrib deeply impressed above, prominent below, rounded or more or less keeled; *primary nerves* c. 10–17 pairs, usually 1–1·5 cm. apart, fine on the upper surface and usually slightly elevate, occasionally lightly impressed, raised below and usually quite distinct, ascending, running straight or curving gently up to an intramarginal nerve 2–3 mm. from leaf margin; secondaries and reticulations raised above or almost or quite invisible, the secondaries below usually raised and distinct but less prominent than the primaries, the reticulations raised and visible or obscure or invisible; petiole up to c. 1·5 cm. long.

Panicles terminal or rarely from upper axils, often clustered, usually shorter than leaves; branchlets numerous, spreading or ascending, rather stout, compressed and angled with blackish striate and wrinkled bark; *flowers* sessile or occasionally very shortly pedicellate, clustered at apices of branchlets, fragrant, calyx pale green, petals and stamens white, disc pale brownish yellow, c. 3 cm. across when fully expanded; *calyx* c. 1 cm. long. globose clavate in bud, more or less campanulate after anthesis, rather suddenly narrowed to a distinct rather stout pseudostalk 2–3 mm. long, the tube from a little below lobes to base of pseudostalk distinctly ribbed when dry; lobes 4, unequal, not persistent, transversely oblong ovate, c. 3–4 mm. across and 2 mm. tall; *petals* 4, free, persisting until after anthesis, semiorbicular, c. 5 mm. diam., rather thick textured with thin margins; *stamens* numerous, up to c. 1·5 cm. long, filaments slender, subulate, anthers broadly ovate, c. 0·7 mm. long, connective gland small, brownish; *style* stouter than filaments, c. 1·3 cm. long; *ovary* 2-celled, multiovulate. *Fruit* c. 2 cm. diam., globose, sharply vertically ribbed when dry, crowned by the cupular calyx rim.

Related to *E. grandis* but leaves usually smaller with less prominent venation, flowers smaller and more abruptly narrowed at base, calyx ribbed, fruit smaller, vertically ribbed and with a prominent cupular calyx rim.

30. **Eugenia grandis** Wight, Ill., II, 17 (1841); King, Mat. F.M.P., No. 12, 96; Gagnep. in Fl. Gen. Indo-Ch., II, 826; Ridl., F.M.P., I, 729; Corner, Wayside Trees of Malaya, p. 498, pl. 148, 149, fig. 168. *Syzygium grande* (Wight) Walp., Repert., II, 180 (1843); Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 176. (Fig. 18*a*).

Wild only on sandy and rocky seacoasts. Much planted inland as a roadside tree.
Distrib: Burma, Indo-China, Siam, Borneo.

A big *tree*, up to c. 30 metres tall; bark greyish buff or pinkish, rough, shallowly fissured, somewhat flaky in big trees; inner bark pale pink to dark reddish, pale yellow near surface. *Twigs* rather slender, terete, brownish or greyish with smooth or slightly flaky bark. *Leaves* coriaceous, elliptic, elliptic oblong, ovate elliptic or ovate rotund, up to c. 25 cm. × 12 cm. or more in saplings, usually smaller, apex more or less shortly acuminate and deflexed, or blunt, base cuneate, or broad and narrowed abruptly on to petiole; upper surface shining in life, minutely glandular punctate, slightly bullate, drying olivaceous to blackish, lower paler in life, dull, with a close covering of very minute pale glistening scaly glands as in *E. palembanica*, drying dark brown or reddish, the glands then almost invisible; midrib impressed above, elevate below and longitudinally wrinkled; *primary nerves* up to c. 14 pairs in large leaves, usually 1–2 cm. apart, usually elevate and slender above, elevate below and slightly ascending, nearly straight or very slightly curved up to an intramarginal nerve 3–6 mm. from leaf margin with often a fainter loop very close to the margin; secondaries and reticulations usually raised on both surfaces and distinct, but less prominent than primaries; petiole channelled above, drying black, up to c. 2 cm. long.

Panicles terminal or from uppermost axils, often clustered, up to c. 14 cm. long, pedunculate or nearly sessile, rachis and spreading branchlets more slender than

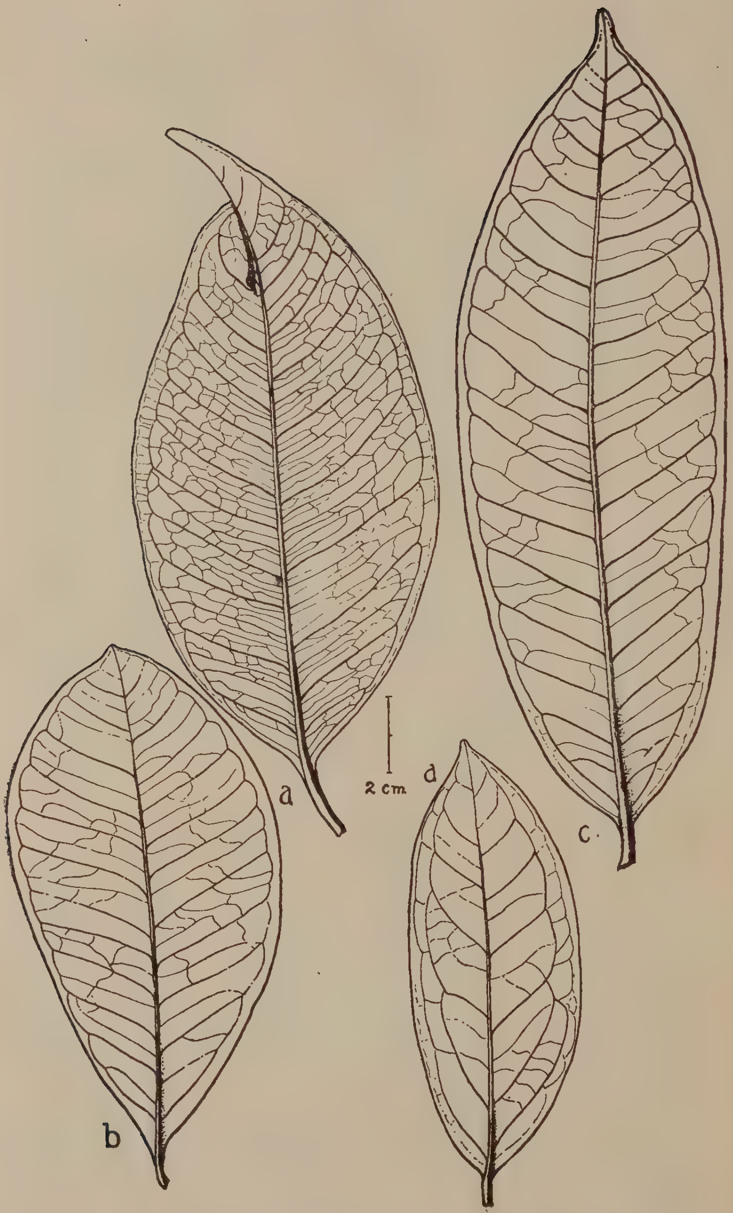

Fig. 18. a, *E. grandis;* b, *E. pachyphylla;* c, *E. atronervia* (small leaf); d, *E. Millsii.*

twigs, compressed, drying dark brown or black; *flowers* c. 2·5–3 cm. across when expanded, fragrant, calyx pale yellow green, petals and stamens white, disc yellow, in threes at branchlet ends, sessile or pedicellate, the outer two flowers of the triads usually sessile or occasionally very shortly pedicellate, the centre flower sometimes on a pedicel as much as 4 mm. long, sometimes sessile; *calyx* c. 1·2 cm long, narrowly campanulate, c. 6–7 mm. across apex before expansion, very slightly constricted below lobes and tapering to a short not very distinctly marked pseudostalk c. 2 mm. long, which is more evident in the dried flower; tube nearly smooth; lobes 4, very unequal, subpersistent, the two outer very short and broad, 1–2 mm. tall, the two inner petaloid, orbicular, concave, thinner, gland dotted, c. 5 mm. diam; *petals* 4, white tinged pale green, more or less orbicular, c. 5 mm. diam., reflexed after anthesis; *stamens* numerous, filaments slender, subulate, up to c. 1·5 cm. long, anthers ovate oblong, or broadly oblong, c. 0·6–0·7 mm. long, connective gland very small and inconspicuous; *ovary* 2-celled, multiovulate.

Fruit more or less globular, often a little compressed laterally, or elliptic or elliptic oblong, more or less asymmetric, up to c. 4 cm. × 3 cm., green when ripe with very faint narrow longitudinal stripes of slightly darker green; apical umbilicus deep, 8–9 mm. diam., fringed with remains of calyx tube and occasionally the calyx lobes, style base persistent; pericarp pithy-leathery, white, c. 3 mm. thick, slightly sweet; seed globose or compressed, up to c. 2·5 cm. diam., testa thick, crustaceous, not easily removed from cotyledons, c. 1 mm. thick; cotyledons nearly equal, very pale green with minute slightly darker dots, inner faces more or less plane, attached to hypocotyle c. 5 mm. from periphery of seed, sessile. Germination hypogeal.

A large fruited form has been found in Government House Domain, Singapore. Its fruits are elliptic to obovoid, pale green to medium green with faint longitudinal narrow lines of darker green, up to c. 5 cm. × 3·5 cm., pericarp white, pithy, slightly juicy, sweet, edible, c. 5 mm. thick, increasing to c. 10 mm. at apex and base of fruit, not so tough as in the ordinary form; apical umbilicus 7–10 mm. diam., deep, fringed with the remains of the calyx lobes and bearing style base; seed 1, more or less conforming to shape of fruit, c. 2·5 × 2 cm., testa pale brown, thick, crustaceous, closely adhering to cotyledons; cotyledons sessile, superposed, one inner face concave, the other convex, surfaces very pale yellow, pink tinged.

31. **Eugenia pachyphylla** Kurz in Journ. As. Soc. Beng., XLII, ii, 332 (1874); Duthie in Hook. fil., F.B.I., II, 477; King, Mat. F.M.P., No. 12, 89; Ridl., F.M.P., I, 733; Corner, Wayside Trees of Malaya, p. 500, fig. 168. *Syzygium pachyphyllum* (Kurz) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 168 (1939). (Fig. 18*b*).

Not uncommon in lowland forest from Kedah and Kelantan to Singapore, and often in ricefields in the north of the Peninsula.

Distrib: Burma, Siam, Borneo.

A *tree* up to c. 13 m. tall; bark rather rugose and tesselately flaky (description from trees in open), pale pinkish grey; inner bark pale pinkish fawn, thick. *Twigs* rather stout, terete, with pale yellow or pale brownish polished bark. *Leaves* coriaceous, obovate to oblong obovate or oblanceolate, apex apiculate or shortly and abruptly acuminate or shortly and bluntly acute, base cuneate and narrowed on to petiole, from c. 6 cm. × 2 cm. to 16 cm. × 8 cm.; upper surface drying olivaceous brown to blackish brown, very minutely punctate, lower surface pale brown to reddish brown, with darker pustulate glands; midrib impressed above, prominent below; *primary nerves* up to c. 15 pairs, spreading-ascending, meeting in a rather faint looped intramarginal nerve 1–3 mm. from leaf margin, obscure and slightly raised above, slender below but distinct; secondaries and reticulations obscure above, faint below; petiole drying black, usually less than 1 cm. long.

Inflorescences terminal or from upper axils, usually paniculate, sometimes racemose, usually clustered, up to c. 17 cm. long but usually c. 7 cm., usually pedunculate, the rachis sometimes elongate, up to 13 cm. long without branchlets; peduncle, rachis and branchlets more or less 4-angled or compressed with brownish or blackish striate bark; *flowers* white, sessile, usually in threes at apices of branchlets, buds globose clavate c. 1 cm. long; *calyx* after expansion c. 1 cm. long, c. 1·5 cm. across mouth and lobes, broadly funnel shaped, tapering from below the lobes to a broad rounded base, the tube gland dotted and with conspicuous longitudinal rounded ridges; lobes 4, spreading after anthesis, broadly triangular rounded, c. 5–6 mm. across at base and 3 mm. tall; *petals* 4, free, quickly deciduous, suborbicular; *stamens* numerous, c. 1·5 cm. long, anthers ovate oblong, c. 0·8 mm. long, connective gland present; *style* stout at base, tapering upwards and slender above, c. 1·7 cm. long; *ovary* 2-celled, multiovulate.

Fruit obovoid or oblong-obovoid with flattened apex, c. 2·5 cm. long and 2 cm. across, smooth with a few shallow vertical ridges, pericarp pulpy, about 5 mm. thick at thickest point; apex with shallow dark coloured depression bearing remains of style and on its margin the fleshy incurved enlarged calyx lobes; seeds one or two, if two hemispherical, if one, more or less globose, c. 1·2–1·4 cm. diam., the testa adhering closely to cotyledons; cotyledons nearly equal, attached to hypocotyle near middle of inner faces, shortly stalked; hypocotyle stout, reaching periphery of seed.

32. **Eugenia atronervia** Henderson in Gardens' Bulletin, Singapore, XI, 299, fig. 1 (1947). (Fig. 18*c*).

JOHORE: Sungai Kayu Ara, Mawai-Jemaluang road, at low elevations in dry *Dryobalanops* forest, *SFN 29328* (*Corner*); 2nd mile, Mawai-Jemaluang road, *Corner s.n.* Known only from these collections.

A *tree* 10–12 m. tall, 10 cm. diam. 2 m. from ground, with low flattened stilt roots. *Bark* dull rufous fawn, smooth, entire, becoming slightly creviced, not pustulate or flaky; inner bark dull madder brown or purplish brown, wood dull reddish brown. *Twigs* very stout, rounded or somewhat flattened, not angled, bark black or brown, smooth or somewhat ridged, not flaky. *Leaves* large, narrowly elliptic, or oblong elliptic or oblong lanceolate, up to c. 36 cm. long and 16 cm. broad, apex shortly and abruptly acuminate, base shortly narrowed and more or less decurrent on petiole; upper surface drying dull fuscous brown, lower surface a warm red brown; *primary nerves* c. 17–21 pairs, somewhat raised above and quite conspicuous as are the reticulations, strongly raised and black below, the lax reticulations also raised and evident, but much less conspicuous than the primaries; secondaries few to none; primaries nearly straight or gently curving up to a slightly looped, well marked intramarginal nerve c. 3 mm. from leaf margin; petiole very stout, widely channelled above, drying black, c. 2 cm. long.

Inflorescence terminal, from 2–5·5 cm. long, stout, the largest with a 4-angled peduncle c. 2 cm. long, with two pairs of stout branchlets, the lower pair 7–8 mm. long, each with 3 terminal flowers, the upper pair distant from the lower by 2·5 cm., each c. 2 mm. long with three flowers each, inflorescence axis produced 5 mm. above upper branchlets and bearing 4 flowers; other inflorescences much shorter, c. 2 cm. long, with one pair of very short stout branchlets each with 3 flowers, and 3 terminal flowers. *Flowers* sessile, buds more or less obovoid, *calyx* campanulate or obconic, rather abruptly narrowed into a very short stout pseudostalk, c. 1·8 cm. long, flower c. 2 cm. across when expanded; calyx lobes 4, persistent, broad, rounded, c. 5 mm. long and 6–7 mm. broad; *petals* free, not quickly deciduous, of same shape and size as sepals but thinner in texture; *stamens* c. 1 cm. long; *style* c. 1·5 cm. long; *ovary* 2-celled, multiovulate.

Fruit more or less depressed globose, up to c. 4 cm. diam., apex with a rather deep excavation c. 5 mm. diam., fringed by the very short (c. 1 mm. tall) remains of calyx tube, bearing withered stamens; surface of fruit nearly black, corrugate with broken shallow vertical ridges and furrows, smooth in places; pericarp probably pulpy or fleshy, up to c. 6 mm. thick; seed 1, transversely oblong globose, c. 2·7 cm. across, testa very thick, adhering closely to cotyledons; cotyledons side by side, nearly equal, outer surface finely rugulose, inner faces conspicuously glandular pustulate, nearly plane with a shallow wide depression, sessile, plumule and radicle rather small, attached near periphery of seed.

This species is characterised by its large leaves, short inflorescences and large flowers. It is probably allied to *E. Dyeriana* King and *E. Hemsleyana* King, but differs from both in the much larger leaves, shorter inflorescence and much larger flowers. It may also be allied to *E. pergamentacea* King but differs from that species in its larger flowers and by the nerves not being impressed on the upper surface of the leaf.

33. **Eugenia Millsii** Henderson in Gardens' Bulletin, Singapore, XI, 301, fig. 2 (1947). (Fig. 18*d*).

KEDAH: Sungai Terap, near Selama, in forest on riverbank at low altitude, *SFN 35431* (*Henderson*).
Known only from one collection.

A *tree* c. 14–17 m. tall, diam. c. 45 cm. at 2 m. from ground, trunk fluted up to c. 2 m. from ground. Bark smooth with irregular surface cracks, brownish grey. *Twigs* terete, stout, bark greyish white or pale brown, smooth, somewhat polished. *Leaves* coriaceous, elliptic or oblong elliptic, up to c. 15 cm. long and 6 cm. broad, base cuneate, apex shortly and bluntly acute, or sometimes more or less acuminate, drying dull brown or cinereous above, dull warm brown below, both surfaces minutely punctate; petiole pale coloured, 5–10 mm. long; midrib impressed above, raised below; *primary nerves* 5–10 pairs, visible but not conspicuous above, very slightly raised and very slightly channelled, raised below and more or less conspicuous, the second or third pair from the base initiating a conspicuous intramarginal nerve 5–8 mm. from the leaf margin, the basal one or two pairs running up in a fainter intramarginal c. 1–3 mm. from margin; secondaries a little finer and less conspicuous than primaries, reticulations practically invisible when dry; petiole 5 mm. or less long, pale.

Inflorescences terminal or from upper axils, of fascicled panicles not exceeding c. 7–8 cm. long, peduncles stout with pale bark, more or less 4-angled and striate. *Flowers* white, in threes at ends of branchlets, the centre flower of the triads sessile, the two outers on very short stout pedicels; *calyx* tube campanulate, c. 4 mm. long and slightly less across base of lobes, slightly contracted just below lobes, narrowed to a stout pseudostalk less than 1 mm. long; lobes 4, semiorbicular, persistent, c. 4 mm. tall and 5 mm. wide; *petals* 4, persistent for some time after the flower is fully open, orbicular, 6 mm. tall and 6·5 mm. wide, free; *stamens* numerous, longest filaments c. 10 mm. long, anthers oblong or broadly elliptic, 0·5–0·6 mm. long; *ovary* 2-celled with many ovules; *fruit* unknown.

Possibly allied to *E. densiflora* var. *angustifolia* but differing in being a fair sized tree, not a bush, with flowers which are smaller and of a different colour. The venation also differs considerably.

34. **Eugenia kemamanensis** Henderson in Gardens' Bulletin, Singapore, XI, 303, fig. 3 (1947). (Fig. 19*a*).

Kemaman: Ulu Ayam, Kajang, c. 500 feet, in forest, *SFN 30352* (*Corner*).
Known only from one collection.

A *tree* c. 8–9 m. tall, *bark* silvery grey, even, entire; inner bark pale pink, green below surface, wood pale buff. *Twigs* terete, with smooth or somewhat striate bark, pale silvery grey when dry. *Leaves* elliptic to elliptic lanceolate, sometimes more or less obovate, apex bluntly acute or shortly bluntly acuminate, narrowed to a rounded or truncate base, up to 18–19 cm. long and 8–9 cm. broad; drying pale brown on both surfaces, the upper surface usually rather darker than the lower, both surfaces minutely rugose when dry; midrib deeply impressed above, strongly elevate below; *primary nerves* distant, c. 9–11 pairs, fine and sunk above, raised below, slender but conspicuous, meeting in a well marked looped intramarginal nerve c. 0·5–1 cm. from leaf margin, with a much fainter intramarginal much nearer the margin; reticulations very faint or invisible above, very fine and lax below; *petiole* pale, rather stout, c. 5 mm. long.

Inflorescences from below leaves or on side twigs, practically sessile, c. 4 cm. long, rachis slender, 4-angled or compressed, with a few distant slender branchlets up to c. 2 cm. long, terminated by flowers in threes; pedicels not exceeding 2 mm. long. *Flower* buds c. 4–6 mm. long, obconic, tapering to a short pseudostalk; *calyx* lobes 4,

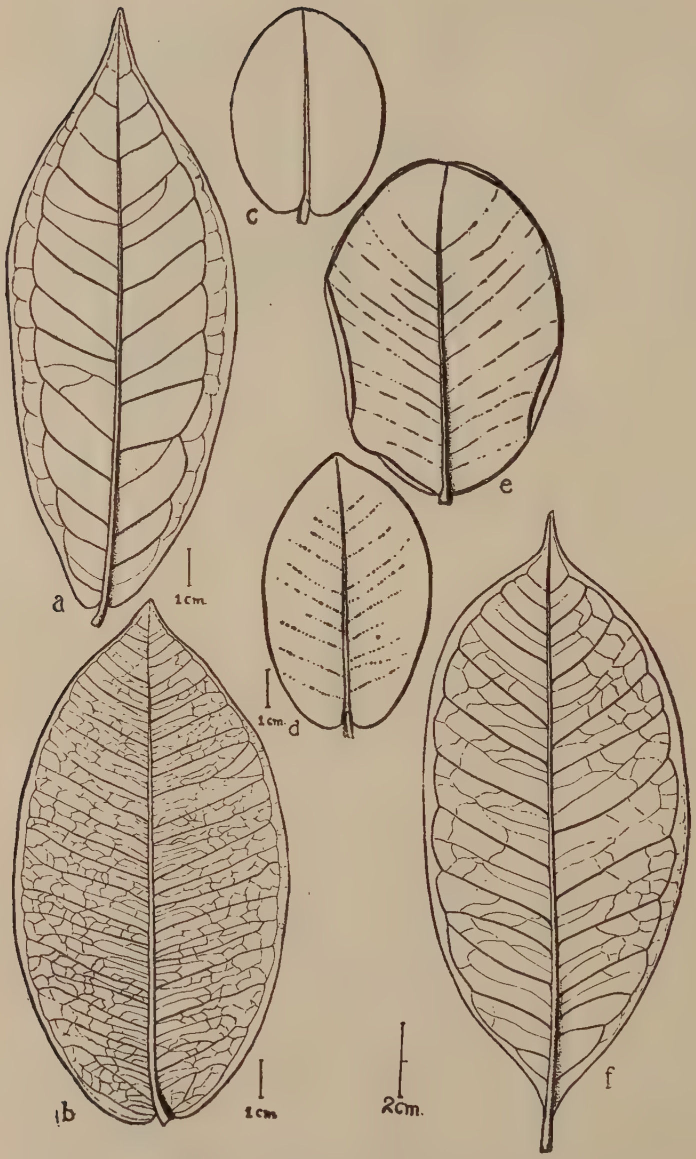
c
e
a
1cm
d
1cm.
b
1cm
2cm.
f

Fig. 19. a, *E. kemamanensis;* b, *E. subdecussata;* c, d, *E. subdecussata* var. *montana;* e, *E. viridescens;* f, *E. Hoseana.*

broad, rounded, concave, c. 4–5 mm. broad and 3 mm. tall., *petals* 4, falling as a calyptra, but separable, similar in shape to calyx lobes but slightly larger and thinner in texture; *stamens* c. 4 mm. long; *style* c. 4–5 mm. long.

Fruit globose to depressed globose, up to 2·3 cm. diam., calyx rim very wide, c. 1·4 cm. diam., apex of fruit not excavate but slightly convex with more or less persistent, widely separated remains of calyx lobes; pericarp fleshy, testa brownish; cotyledons side by side, nearly equal, opposing faces nearly plane, except for a narrow radial ridge on one fitting into a corresponding groove on the other, shortly broadly stalked.

Very little material of this species is known, but it appears to be sufficiently distinct and not closely related to any other Malayan species.

35. **Eugenia cordifoliata** Ridl. in Journ. Roy. As. Soc. Str. Br., LXXIX, 66 (1918); F.M.P., I, 736. *E. Swettenhamiana* King, Mat. F.M.P., No. 12, 126 (1901), quoad specimina Scortechiniana.

PERAK: sine loc., *Scortechini s.n.* (type collection).

Known only from the above collection. See note under *E. Swettenhamiana.*

? A *tree.* *Branches* terete, pale. *Leaves* elliptic, membranous, c. 10 cm. × 3·5–4 cm., apex bluntly acuminate, narrowed to a rounded subcordate almost peltate base, upper surface drying blackish, lower paler; *primary nerves* c. 18 pairs, obscure above, slightly elevate below, meeting in an intramarginal nerve; petiole short, stout, less than 5 mm. long.

Panicles terminal, lax, c. 15 cm. long on a peduncle c. 5 cm. long, branchlets angled, up to c. 7·5 cm. long; *flowers* in threes at branchlet ends; buds pyriform, narrowed to a slender pseudostalk, calyx lobes ovate. *Fruit* unknown. (ex Ridley).

36. **Eugenia subdecussata** Duthie in Hook. fil., F.B.I., II, 491 (1878); King, Mat. F.M.P., No. 12, 121, incl. var. *colorata* King; Ridl., F.M.P., I, 752; Corner, Wayside Trees of Malaya, p. 503, fig. 168. *E. colorata* Duthie, loc., cit., 492. *Syzygium subdecussatum* Wall. Cat., nom. nud. (Fig. 19*b*).

Common in lowland forest from Penang to Singapore, mostly to the west of the Main Range, but also on the rocky shores and islands of the east coast.
Distrib: Sumatra.

A *tree* up to c. 24 m. tall, trunk slightly fluted at base or not; bark smooth, becoming rather finely and closely reticulately creviced or fissured, not scaly rugose or pustulate, pinkish brown, often with greyish bloom; inner bark thick, pale pinkish brown to reddish buff. *Twigs* slender, terete, compressed below nodes, with brownish or greyish smooth or slightly flaky bark. *Leaves* thickly coriaceous, elliptic or oblong elliptic, sometimes elliptic ovate or elliptic obovate, from c. 5 cm. × 2 cm. to c. 15 cm. × 7 cm., apex acute, or acuminate, often very shortly and abruptly so, sometimes rounded, base more or less narrowed and more or less cordate, occasionally cuneate; upper surface polished, drying brown to blackish brown, minutely punctate, lower surface dull, drying brown to reddish brown, closely pustulate glandular with minute pale scale-like glands; midrib impressed above, prominent below and more or less keeled or longitudinally wrinkled; *primary nerves* up to c. 15 pairs, c. 0·5–1 cm. apart, usually spreading ascending and meeting a fine intramarginal nerve 1–3 mm. from leaf margin, slightly elevate and very slender on both surfaces but more distinct below, the secondaries below often as distinct as primaries, the reticulations when visible almost as distinct as secondaries; petiole less than 5 mm. long, the leaves often subsessile.

Panicles terminal or occasionally from upper axils, up to c. 10 cm. long, often clustered, usually pedunculate, peduncles from less than 1 cm. long to c. 5·5 cm., the peduncle, rachis and branchlets rather slender, much compressed, with dark striate bark, lower branchlets ascending, 2–4 cm. long, the upper ones spreading, shorter; *flowers* white, calyx green often flushed purple at apex, clustered at ends of branchlets or on very short tertiary branchlets, buds clavate, c. 6 mm. long; *calyx* funnel shaped, c. 5 mm. long, c. 3 mm. across mouth, narrowed to a rather stout pseudostalk c. 3 mm. long, lobes 5, obscure, very shortly and broadly triangular; *petals* calyptrate; *stamens* numerous, filaments slender, up to c. 3·5 mm. long, anthers broadly ovate, c. 0·4 mm. long, connective gland rather conspicuous; *style* very stout, c. 3·5 mm. long; *ovary* 2-celled.

Fruit globose or pyriform up to c. 2·5 cm. diam., smooth, green flushed dull red pink on one side when ripe, apical umbilicus narrow and deep, c. 3–4 mm. diam., without calyx tube but fringed with remains of calyx lobes; pericarp thin, sweetish, 2–3 mm. thick; seed 1, more or less globose, testa very thick and pithy, closely adhering to the cotyledons; cotyledons equal, side by side, creamy pale brown, slightly rugose and conspicuously gland dotted, inner faces slightly concave, gland dotted, attached centrally to the hypocotyle by very short broad stalks.

E. subdecussata Duthie var. **montana** King, Mat. F.M.P., No. 12, 191 (1901). (Fig. 19*c*, *d*).

Common in mountain forest on the Main Range and recorded also from Kedah Peak and Gunong Sagi in Kelantan.

This variety differs from the typical form in having a more or less shrubby habit and smaller and broader and blunter leaves. The leaves, however, vary considerably, from almost rotund, obtuse at apex and cordate at base, to oblong elliptic or obovate with a short blunt point and rounded or cuneate at base. In view of the great variation in leaf form in both the typical and varietal forms and also of the fact that the typical form is by no means confined to the lowlands, it seems probable that var. *montana* is hardly worth keeping up.

As King points out, *Syzygium apodum* Miq., Fl. Ind. Bat. Suppl. I, 312 (1860) is very close to *E. subdecussata*. I have seen a sheet of what is probably the type collection (leg. *Teysmann*, Sumatra ad littora Siboga) preserved in Herb. Calcutta. This differs from *E. subdecussata* in the blunter leaves with more pronounced recurved margins, the polished yellow paler branches and the slightly thicker inflorescence branchlets. Typical *E. subdecussata* is known from Sumatra, and further collections and collections of fruit may show that *S. apodum* is distinct. If it is regarded as conspecific with *E. subdecussata*, Miquel's specific epithet will take precedence over Duthie's, for *Syzygium subdecussatum* Wall. is a *nomen nudum* not validated until 1878.

37. **Eugenia viridescens** Ridl. in Journ. Linn. Soc., XXXVIII, 308 (1908); F.M.P., I, 752. (Fig. 19*e*).

PAHANG: Gunong Tahan, *Ridley 16031*, 5,000 feet, *Wray & Robinson 5338* (type collection), Wray's Camp, *Ridley 16275*, Seat Point, 5,460 feet, *FMS Mus. 12180* (*Kloss*), Padang, *Corner s.n.*
Known only from Gunong Tahan.

A *shrub*. *Leaves* on youngest shoots elliptic or narrowly obovate, narrowed to both ends, apex abruptly acuminate or apiculate; older leaves oblong elliptic or obovate, reaching c. 9 cm. × 6 cm., apex rounded, shortly apiculate or retuse, base rounded or narrowed, nearly sessile; midrib narrowly channelled above, bold and keeled below; *primary nerves* up to c. 15 pairs, faint and slightly raised above, faint below, slender, raised, c. 5 mm. apart, joining an intramarginal nerve which is usually hidden by the strongly revolute leaf margin, secondaries and reticulations faint above, secondaries below almost indistinguishable from primaries, reticulations invisible or very faint; upper surface more or less polished, olive green to dark brown when dry, sometimes pustulate, often gland pitted, lower surface dull, pale brownish to dark brown, usually black dotted.

Panicles terminal, dense, up to c. 5 cm. long, peduncle short or almost none, branchlets rather slender, the lower ones up to c. 3 cm. long, the upper shorter, more or less angled with striate bark; *flowers* crowded, *calyx* tube c. 4 mm. long, campanulate, narrowed to a short stout pseudostalk c. 1 mm. long, the centre flower of the groups of three with a slightly longer and more slender pseudostalk than the outer two; calyx lobes broad and shallow but distinct; *petals* falling in a calyptra; *stamens* short, c. 1·5 mm. long, filaments broad at base and tapering upwards, connective gland small and inconspicuous; *style* short, stout. *Fruit* unknown.

38. **Eugenia Wrayi** King, Mat. F.M.P., No. 12, 119 (1901); Ridl., F.M.P., I, 753. (Fig. 20*a*).

PERAK: Ulu Batang Padang, 4,900 feet, *Wray 1504* (syntype); Gunong Bubu, 5,000 feet, *Wray 3859* (syntype); Gunong Korbu, 5,000 feet, *Haniff 3915* (*Ridley's no. 16306*), 5,500 feet, *Forest Dept. FMS 31447*.

SELANGOR: Gunong Mengkuang, 5,000 feet, *Robinson s.n.*

PAHANG: Padang, Gunong Tahan, c. 5,500 feet, *Seimund 358*; Gunong Batu Brinchang, 6,700 feet, *SFN 23586* (*Henderson*), *Forest Dept. FMS 36518*; summit of Gunong Irau, *Forest Dept. FMS 36552, 36569*; Cameron Highlands, *Forest Dept. FMS 23886, 25941*; Gunong Benom, 6,900 feet, *Forest Dept. FMS 22335*.

Distrib: Endemic.

A *shrub* or small *tree*. Youngest *twigs* 4-angled, dark brown, smooth, older twigs terete with rough greyish bark. *Leaves* thickly coriaceous, broadly elliptic or elliptic ovate or elliptic obovate to subrotund, up to c. 5 cm. × 3·5 cm., apex obtuse or retuse or with a very short blunt point, base round, sometimes subcordate, sometimes more or less narrowed; upper surface drying brown to blackish brown, punctate, lower surface paler, reddish brown, black gland dotted; midrib impressed above, broad and hardly elevate below; *primary nerves* numerous and hardly distinguishable from secondaries and reticulations, ascending to an obscure intramarginal nerve close to the leaf margin; venation above often obscure or invisible, sometimes slightly raised, raised and distinct below, the veins broad and closely reticulate; petiole less than 5 mm. long drying dark.

Panicles terminal, short and compact, almost hidden by the leaves, up to c. 2 cm. long and as much across, sessile or shortly pedunculate, branchlets very short and stout, crowded, more or less 4-angled; *flowers* greenish, sessile, usually in threes at branchlet apices, buds shortly globose

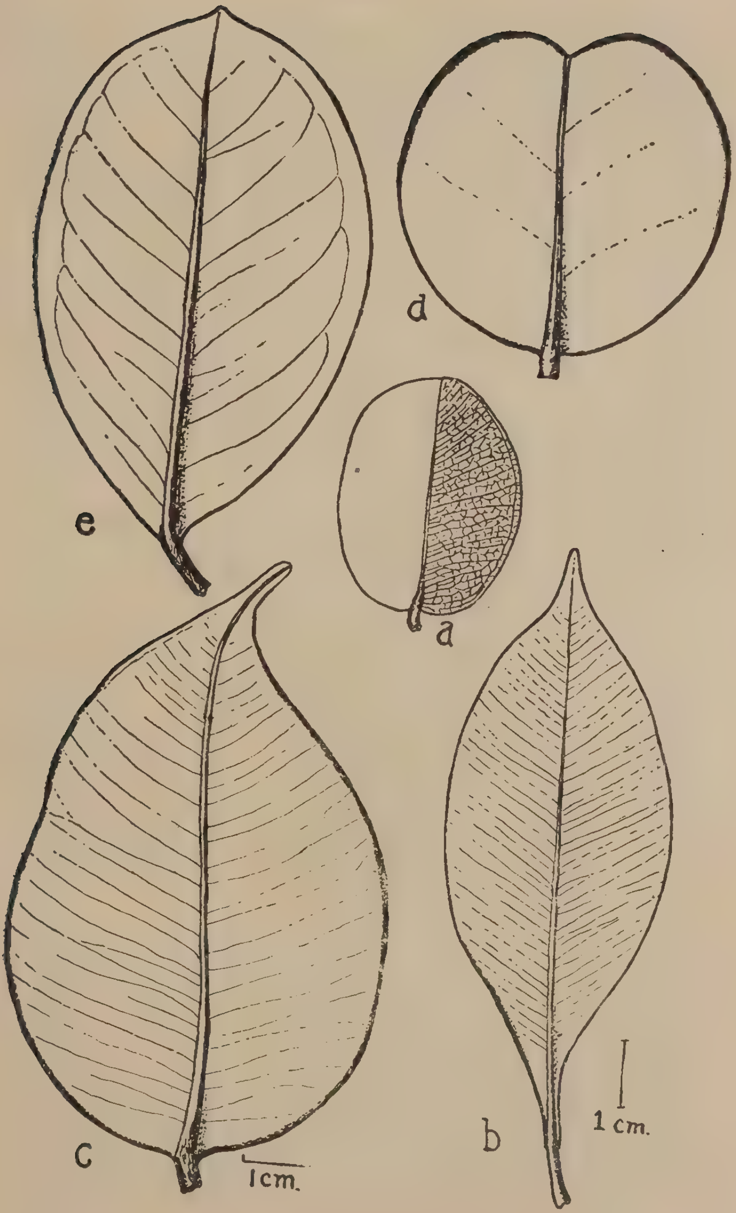
d
e
a
c
1cm.
b
1 cm.

Fig. 20. a, *E. Wrayi;* b, *E. inasensis;* c, d, *E. pahangensis;* e, *E. tahanensis.*

clavate; *calyx* tube funnel shaped, c. 5 mm. long, gradually narrowed to base, slightly ridged, gland dotted, the pseudostalk not distinctly marked off; lobes 5, subpersistent, broadly oblong rounded, gland dotted, c. 1·7 mm. across and 1 mm. tall; *petals* free (perhaps falling in a very loose calyptra), orbicular, 2–2·5 mm. diam.; *stamens* numerous, variable in length, reaching c. 5·5 mm., filaments rather stout, subulate, anthers ovate oblong, c. 0·5 mm. long, connective gland rather large; *style* rather stouter than filaments, c. 6 mm. long.

Young *fruit* globular, crowned by the conspicuous calyx rim and enlarged sepals, the latter disappearing before the fruit ripens. Ripe fruit more or less globose or oblong globose, c. 1 cm. diam., crowned by the short calyx rim, black or blackish brown when dry and wrinkled; pericarp in boiled up fruits smooth, rather thick; seed 1, c. 0·75 cm. diam., testa thick, brown, cotyledons nearly equal, inner faces nearly plane, attached to hypocotyle near their centres by short broad stalks.

39. **Eugenia inasensis** King, Mat. F.M.P., I, No. 12, 120 (1901); Ridl., F.M.P., I, 751. (Fig. 20*b*).

PERAK: Gunong Inas, 5,000 feet, *Wray 4144, 4150, 4154*. Known only from these collections.

A small *tree*. *Twigs* rather stout, terete, compressed below nodes, bark nearly smooth, yellowish. *Leaves* coriaceous, elliptic, or broadly elliptic oblong, sometimes slightly obovate, from c. 5 cm. × 2 cm. to 10 cm. × 5·5 cm., apex shortly and abruptly acuminate, base tapered and decurrent on petiole; upper surface more or less polished, drying yellowish brown to blackish brown, closely and minutely punctate, lower surface dull, brownish; midrib impressed above, bold below; *primary nerves* numerous, slightly raised and inconspicuous on both surfaces, reticulations not visible; petiole channelled above, drying black and wrinkled, up to c. 1 cm. long.

Panicles terminal or from uppermost axils, solitary or clustered, up to c. 4 cm. long, peduncles up to c. 1·5 cm. long, branchlets short, spreading, 2–3 pairs, they and the peduncle rather stout, but thinner than twigs, 4-angled or compressed, with blackish striate bark; *flowers* white, sessile, in threes at branchlet ends, buds obovoid, 6–7 mm. long; *calyx* after expansion funnel shaped, tapering to base without a distinctly marked pseudostalk, c. 5 mm. long and 4 mm. across mouth; lobes 5, unequal, inconspicuous, the largest transversely oblong ovate c. 2 mm. across and 1 mm. tall; *petals* falling in a calyptra c. 4·5 mm. diam., more or less agglutinated; *stamens* numerous, variable in length, up to c. 5·5 mm. long, the filaments subulate, stout at base and tapering upwards, anthers ovate oblong, 0·5–0·8 mm. long, connective gland small; *style* stouter than filaments, c. 5 mm. long; *ovary* 2-celled. *Fruit* unknown.

Allied to *E. pahangensis* and its variety *Fraseri* rather than to *E. subdecussata* as King suggests.

40. **Eugenia pahangensis** Ridl. in Journ. Linn. Soc., XXXVIII, 307 (1908); F.M.P., I, 751. (Fig. 20*c*, *d*).

PAHANG: Gunong Tahan, *Ridley 16015*, 5,000–6,000 feet, *Wray & Robinson 5454* (type collection), Padang, *FMS Mus. 12244, 12249* (*Kloss*), *SFN 20665* (*Holttum*), 5,300–7,000 feet, *SFN 7936* (*Haniff & Nur*), summit, 7,186 feet, *FMS Mus. 12139*, *Corner s.n.*

Distrib: Endemic.

A small *tree*, bark greyish pinkish, slightly flaky; inner bark pale pinkish brown. *Twigs* stout, terete, compressed below nodes, bark smooth, whitish, yellowish or pale brown. *Leaves* very coriaceous, elliptic or ovate elliptic to orbicular, from c. 4·5 cm. × 4·5 cm. to 16 cm. × 8 cm., apex shortly acute, shortly and abruptly acuminate, rounded, or retuse, base rounded, sometimes subcordate, sometimes shortly and abruptly narrowed to petiole; upper surface drying olivaceous brown to blackish brown, somewhat polished, usually closely and minutely punctate, lower surface dull and paler; midrib impressed above, prominent below and keeled or longitudinally wrinkled; *primary nerves* up to c. 30 pairs, c. 0·5 to nearly 1 cm. apart, spreading, the basal ones often curving downwards, meeting in a nearly straight intramarginal nerve c. 2 mm. from leaf margin, slender and slightly elevate above, and usually quite distinct, varying from slender and elevate below and distinct to invisible, the secondaries and reticulations varying in the same manner; petiole stout, channelled above, drying black and wrinkled, up to c. 1 cm. long.

Panicles terminal or occasionally from upper axils, up to c. 6 cm. long and wide, clustered, crowded, usually pedunculate, sometimes sessile, peduncles reaching 3–5 cm. long, very stout, often as stout as twigs, compressed and angled with dark striate bark, smooth in life; branchlets usually two pairs, the lower up to c. 2 cm. long, ascending, the upper shorter and more spreading; *flowers* sessile, crowded at branchlet ends, white or greenish white, disc orange; *calyx* broadly obconic, finely gland dotted, c. 5 mm. long, 4 mm. across mouth, tapered slightly to a broad truncate base or narrowed to a very indistinct pseudostalk; lobes 5, persistent, broadly triangular acute, c. 2 mm. across and 1 mm. tall; *petals* 5, free, slightly unequal, ovate orbicular, the largest c. 3 mm. diam.; *stamens* numerous, variable in length, reaching c. 6 mm., the filaments rather stout, subulate, anthers oblong, c. 0·8 mm. long, connective gland conspicuous, dark brown; *style* stouter than filaments, 4 mm. long; *ovary* 2-celled with several ovules.

Fruit more or less globose, smooth, with one or two well marked or faint vertical ridges, c. 2·5 cm. diam., apical umbilicus rather shallow, c. 5 mm. diam., fringed by the enlarged incurved calyx lobes and bearing the short style remains; pericarp 1–2 mm. thick; cotyledons more or less equal, superposed, smooth with rather conspicuous raised gland dots; inner faces nearly plane, attached to the hypocotyle by very short broad stalks.

E. pahangensis Ridl., var. **Fraseri** var. nov.

A typa foliis tenuioribus, acuminatis, basi attenuatis, calycis lobis brevioribus differt.

PAHANG: Fraser Hill,, 3,000–4,000 feet, *SFN 33202* (*Corner*), TYPE collection, holotype in Herb. Singapore.

The variety here described as new differs from the typical form in the much thinner leaves, narrowed at the base and with an acuminate apex, the more slender twigs and the shorter, smaller, more acute calyx lobes. The collector describes it as a common canopy tree 80 feet or more tall with a heavy crown as in *E. grandis*, the outer bark grey, rather pale, flaking in angular pieces, but not conspicuously, not fissured or ridged, inner bark vinaceous brown; calyx green, disc orange, petals and filaments white, petals calyptrate.

SFN 33202 was distributed from Singapore as *E. inasensis* King. It is doubtless allied to this species, but differs in the leaves not being pitted above, with more prominent nerves above, and in the different shape of the calyx with smaller, acute, not broad and shallow lobes. More material of the variety, and fruit, may show it to be a distinct species, closely allied to *E. pahangensis* and to *E. inasensis*.

41. **Eugenia tahanensis** Ridl. in Journ. F.M.S. Mus., VI, 146 (1915); F.M.P., I, 752. (Fig. 20*e*).

PAHANG: Gunong Tahan ("top of Tahan"), *Ridley 16032* (type collection), 6,000 feet, *Forest Dept. FMS 42889*, *Corner s.n.*
Known only from Gunong Tahan.

A *shrub* or treelet or dwarf shrub, bark grey or pinkish grey, slightly flaky, inner bark pale brown. *Twigs* very stout, terete, bark pale, the youngest twigs with dark bark. *Leaves* stiff, coriaceous, elliptic or obovate, up to c. 10 cm. long and 7·5 cm. broad, apex rounded, retuse, or very shortly acute, base more or less narrowed, sometimes rounded and very shortly narrowed on to petiole; petiole up to c. 1·5 cm. long, dark coloured, stout, channelled above; midrib impressed above, raised below; *primary nerves* up to c. 9 pairs, 0·5–1 cm. apart, very fine and channelled above, slender and inconspicuous below in the type but in later collections dark coloured and more conspicuous, no definite intramarginal vein; secondaries and reticulations usually very faint or invisible on both surfaces; in the type both surfaces drying dull brown, the lower paler, in other collections the upper surface polished, dark red brown, the lower dull, paler, upper surface usually minutely punctate.

Inflorescences fascicled, terminal or from upper axils, up to c. 7 cm. long; peduncle variable in length, up to c. 4 cm., it and the branchlets compressed and striate; *flowers* crowded at the ends of the very short ultimate branchlets, sessile; *calyx* narrowly obconic, without pseudostalk, c. 5 mm. long, c. 3·5 mm. across mouth, black when dry and wrinkled; lobes 4, incurved in bud, persistent, broadly ovate, rounded, after anthesis the calyx tube campanulate; *petals* united in a thick calyptra; *stamens* numerous, up to c. 1·5 mm. long, filaments broad at base, tapering upwards, anthers broadly elliptic, connective gland rather conspicuous; *style* short.

Fruit broadly oblong, c. 1·75 cm. long, smooth, apex without calyx tube, umbilicus shallow, 6–7 mm. diam., fringed with the incurved enlarged calyx lobes and bearing short style remains; pericarp 1–3 mm. thick; seed more or less globose, c. 1·25 cm. diam., testa adhering to cotyledons, somewhat leathery with an outer thin membranous layer and an inner thicker pithy layer; cotyledons more or less equal, side by side, inner faces ridged and furrowed, attached near their centres by short broad stalks to the stout faintly tesselate hypocotyle which reaches the periphery of the seed.

42. **Eugenia Hoseana** King, Mat. F.M.P., No. 12, 106 (1901); Ridl., F.M.P., I, 733. *Syzygium Hoseanum* (King) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 150 (1939). (Fig. 19*f*).

PERAK: Larut, 300–500 feet, *Kunstler 3407* (syntype); Maxwell's Hill, *Wray 2952* (syntype); Gunong Kledang, *Ridley 9668;* sine loc., *Scortechini 163* (syntype).

JOHORE: Palace Gardens, *Ridley 11989.*

Distrib: Borneo.

A *tree* c. 12 m. tall. *Twigs* terete, compressed below nodes, the youngest quadrangular, bark smooth, pale yellow or pale greyish yellow. *Leaves* coriaceous, elliptic, elliptic oblong or somewhat obovate, up to c. 15 cm. × 7 cm., apex abruptly caudate acuminate, base narrowed and decurrent on petiole; upper surface drying dark brown to blackish brown, somewhat polished, minutely punctate, lower surface dull, pale brown, minutely pustulate; midrib impressed above, prominent and rounded below; *primary nerves* 12–20 pairs, 1–1·5 cm. apart, impressed above, prominent below, ascending and running straight or very slightly curved to a well marked looped intramarginal nerve c. 3–5 mm. from leaf margin, with another faint loop much nearer margin; secondaries and reticulations obscure above, the secondaries below distinct but less prominent than primaries, the reticulations lax and faint; petiole less than 1 cm. long.

Inflorescences racemose, axillary and terminal, solitary or clustered, short and compact, not exceeding c. 2 cm. long, rachis angled and grooved; *flowers* sessile, white, surrounded and almost hidden by several leathery gland dotted bracts with thin margins, the outer ones ovate acuminate or ovate oblong apiculate, up to c. 9 mm. × 8 mm., the inner ones oblong ovate or obovate, shorter and blunter; *calyx* 6–7 mm. long, widely campanulate, tapered to base, the pseudostalk usually not distinct, tube wrinkled or more or less ridged below; lobes 5, concave, incurved over petals in bud but not overlapping, erect after anthesis, persistent, oblong, ovate blunt, c. 3 mm. across and 2·5 mm. tall; *petals* 4, falling as a calyptra but not agglutinated and easily separable, orbicular, c. 4·5 mm. diam.; *stamens* numerous, variable in length, up to c. 6 mm. long, filaments subulate, anthers oblong, 0·7–0·9 mm. long, connective gland small but distinct; style stouter than filaments, c. 5·5 mm. long; *ovary* 2-celled.

Fruit (? unripe) oblong globose, a little over 1 cm. diam., faintly vertically ridged, apex convex, bearing style remains, fringed by the very short calyx tube and the enlarged incurved calyx lobes; pericarp apparently leathery; seed 1, globose, 7–8 mm. diam., the rather thick crustaceous testa adhering closely to cotyledons; cotyledons unequal, inner faces gland dotted, with a well marked sharp ridge crossing the whole face, the cotyledons attached at the central point of the ridges by short stalks to the long stout hypocotyle which reaches the periphery of the seed.

Distinct in the pale polished twigs, well marked primary nerves, and the very short compact inflorescences with large and conspicuous persistent bracts.

43. **Eugenia variolosa** King, Mat. F.M.P., No. 12, 107 (1901); Ridl., F.M.P., I, 736. (Fig. 21*a*).

PERAK: Larut, within 10 feet, *Kunstler 3995* (syntype); 500–800 feet, *Kunstler 2796*, 300–800 feet, *Kunstler 3415* (syntype); Gopeng, 500–800 feet, *Kunstler 6036* (syntype); Bikum Reserve, *Forest Dept. FMS 368;* Kledang Saiong Forest Reserve, *Forest Dept. FMS 25812, 33727, 33728;* sine loc., *Scortechini s.n.*

SELANGOR: Kuala Lumpur, *Ridley's collector 4973* (syntype); Sungai Buloh Forest Reserve, *Forest Dept. FMS 457, 2279, 3308;* Weld Hill Forest Reserve, *Forest Dept. FMS 936, 8261, 10841.*

Distrib: Endemic.

A *shrub* or small *tree.* Young *twigs* slender, 4-angled, bark brown, copiously pustulate, older twigs terete. *Leaves* thinly coriaceous, oblong lanceolate or narrowly oblong elliptic, apex caudate acuminate, base cuneate, up to c. 18 cm. × 6 cm., upper surface drying pale brown to dark brown, pustulate and often also punctate, lower surface paler, pustulate with dark raised glands; midrib impressed above, prominent below and more or less keeled, pustulate; *primary nerves* up to c. 15 pairs, over 1 cm. apart, very slightly raised and very faint above, raised below, slender but very distinct, ascending, running straight or curving up to a well marked looped intramarginal nerve c. 4–7 mm. from leaf margin, with a much fainter loop c. 2 mm. from margin and a very faint one still closer; secondaries slightly less distinct below than primaries, reticulations lax and very fine; petiole rather slender, channelled above, c. 1 cm. long.

Inflorescences terminal and axillary, racemose, short, clustered, not exceeding c. 2·5 cm. long, rachis pustulate; *flowers* white, usually pedicelled, pedicels up to c. 5 mm. long or almost none, with a minute broad rounded subpersistent bracteole subtending the flower; buds c. 1 cm. long; *calyx* narrowly campanulate, tube c. 7 mm. long, conspicuously glandular pustulate, tapered to an obscure pseudostalk less than 1 mm. long; lobes 4, deciduous, conspicuously glandular pustulate, very unequal, the two outer broadly rounded, c. 3 mm. across and 2 mm. tall, the two inner orbicular, c. 5 mm. diam., subpetaloid; *petals* 4, free, reflexed after anthesis, c. 5·5 mm. long and 5 mm. broad, broadly oblong with large scattered gland dots; *stamens* numerous, filaments very slender, up to c. 1·5 cm. long, anthers elliptic, c. 0·4 mm. long, connective gland not visible; *style* slender, but stouter than filaments, c. 2 cm. long.

Fruit globular, smooth, prominently gland dotted, c. 2 cm. diam., apex convex, fringed by the short calyx rim.

Easily recognised by the pustulations on leaves, twigs and flowers, and by the very short inflorescences with narrow flowers and long, very slender stamens.

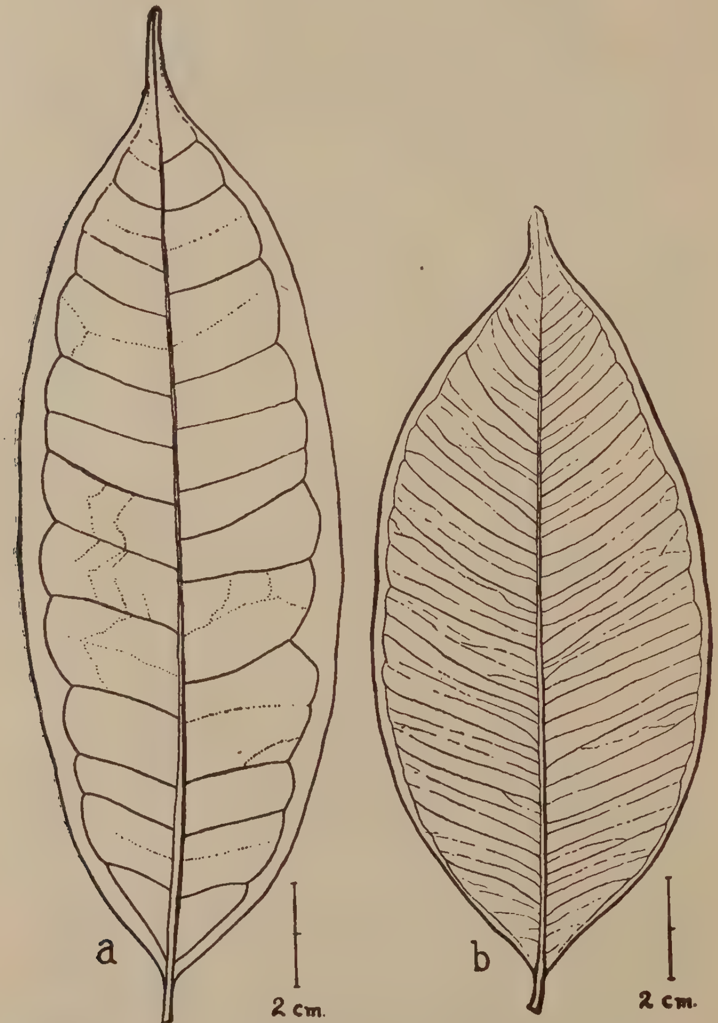

Fig. 21. a, *E. variolosa;* b, *E. chlorantha.*

44. **Eugenia chlorantha** Duthie in Hook. fil., F.B.I., II, 487 (1878), excl. syn.; King, Mat. F.M.P., No. 12, 97; Gagnep. in Fl. Gen. Indo-Ch., II, 806; Ridl., F.M.P., I, 734; Corner, Wayside Trees of Malaya, p. 494, fig. 168. *E. Hullettiana* King, loc. cit., 97 (1901); Ridl., loc. cit., 735. *Syzygium chloranthum* (Duthie) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 173 (1939). (Fig. 21*b*).

Common in lowland forest from Kedah and Penang (where it is very common on Penang Hill) to Singapore.

Distrib: Annam (ex Fl. Gen. Indo-Ch.), ? Siam, Sumatra, Borneo.

A *tree* reaching c. 24 m. tall, bark smooth, entire, finely lenticellate or finely creviced, sometimes with faint horizontal distant ridges, sepia or salmon colour or dull dark red; inner bark pale brown; wood dark tan yellowish, hard. *Twigs* slender, terete, compressed below nodes, bark smooth, dark brown. *Leaves* thinly coriaceous, elliptic, ovate elliptic or elliptic oblong, occasionally lanceolate, from c. 6·5 cm. × 2·5 cm. to 19 cm. × 8·5 cm., apex acuminate or caudate acuminate, base cuneate, upper surface usually drying greenish or brown to blackish brown, minutely pustulate or occasionally punctate, lower surface drying greenish or brownish, closely pustulate; midrib impressed above, elevate below; *primary nerves* numerous, c. 30 pairs, usually 3–5 mm. apart, very fine and slender, slightly raised above and obscure or faint, raised below and distinct, meeting in a fine intramarginal nerve c. 2–3 mm. from leaf margin; secondaries below hardly distinguishable from primaries, reticulations very fine, sometimes invisible; petiole rather slender, up to c. 1 cm. long.

Panicles terminal or axillary, up to c. 8 cm. long (up to 14 cm. in fruit), pedunculate or nearly sessile, branchlets rather slender, angled or compressed, usually short but reaching c. 3 cm., spreading-ascending; *flowers* fragrant, greenish white with rose red stamens, or the calyx and petals flushed deep pink, appearing crowded in the shorter inflorescences, usually in threes at branchlet ends, the centre flower on a very short stout pedicel, the outers sessile; mature buds c. 1–1·2 cm. long, clavate; *calyx* c. 8 mm. long, c. 6 mm. across mouth after anthesis, contracted just below lobes into a thick, ridged, cylindric or slightly tapering tube 5–6 mm. long; lobes 4 (sometimes 5), spreading-erect, persistent, thick, ovate triangular blunt, 3–4 mm. across base and c. 2 mm. tall; *petals* 4, free, reflexed after anthesis, then deciduous, orbicular with a short thick claw, c. 6 mm. diam.; *stamens* numerous, variable in length, reaching c.

1 cm., filaments subulate, anthers broadly oblong, c. 0·7–0·8 mm. long without connective gland; *style* much stouter than filaments, c. 1 cm. long; *ovary* 2-celled, multiovulate.

Fruit subglobular, 1–2 cm. diam., green flushed rose purple, vertically ridged when young, apical excavation deep and narrow, c. 3–4 mm. diam., fringed by the short calyx rim and the upright or reflexed, hardly enlarged calyx lobes.

The only difference that I can detect, in the herbarium, between *E. chlorantha* and *E. Hullettiana* is the larger and more spreading inflorescence of the latter. Kunstler describes the stamens of *E. Hullettiana* as white, slightly red towards centre, while the stamens of *E. chlorantha* are rose red.

Ridley remarks that *E. Hullettiana* is very close to *E. Helferi* but it is really quite distinct from that species both in foliage and flower characters.

45. **Eugenia Ngadimaniana** Henderson in Gardens' Bulletin, Singapore, XI, 305, fig. 4 (1947). (Fig. 22*a*).

JOHORE: Sungai Kayu, Mawai-Jemaluang road, in swampy forest, *SFN 32152 (Kiah)*.

SINGAPORE: Bukit Timah Reserve, altitude under 500 feet, *SFN 36129, 37012, 37020 (Ngadiman)*.

A *tree* c. 20 m. tall, bark pale brown or fawn brown, nearly smooth with fine irregular cracks, scaling in occasional irregular pieces, with irregular longitudinal pits or dimples; inner bark thick, dull red or reddish brown. *Twigs* terete, with dark brown, reddish brown or greyish brown bark. *Leaves* thinly coriaceous, narrowly elliptic or elliptic lanceolate or oblong elliptic, apex abruptly acuminate or caudate acuminate, base long narrowed on to petiole, from c. 6 cm. × 3·5 cm. to c. 13 cm. × 5 cm.; upper surface when dry smooth, pale brown to dark brown, lower surface usually paler, with minute slightly raised gland dots; midrib impressed above in a dark coloured channel, raised below; *primary nerves* c. 7–13 pairs, 5–10 mm. distant, slender but distinguishable from secondaries, sunk in narrow channels above, slightly elevate below, meeting in an inconspicuous intramarginal nerve 1–2 mm. from leaf margin; secondaries below nearly as conspicuous as primaries but distinguishable from them, reticulations below usually faint; petiole slender, 1–1·5 cm. long, finely wrinkled.

Panicles terminal or from upper axils, solitary or more usually several from each axil or branchlet ends, up to c. 9 cm. long, peduncle 2–5 cm. long with pale longitudinally wrinkled bark; branchlets 2–4 pairs, the lowest up to c. 2 cm. long, the upper shorter, almost horizontal or curving upwards; *flowers* crowded at branchlet ends or at ends of short secondary branchlets, sessile, bracteoles oblong lanceolate, subacute, subpersistent, c. 1·5 mm. long; buds more or less obovoid, c. 6–6·5 mm. long; *calyx* obconic, 3–4 mm. long, c. 3·5–4 mm. across mouth, without pseudostalk, lobes 5, shallow and broad, acute or subacute, inconspicuous, c. 2 mm. wide and 0·5 mm. tall; *petals* falling in a calyptra but not agglutinated, more or less orbicular, c. 3 mm. diam., conspicuously gland dotted; *stamens* up to c. 8 mm. long, anthers c. 0·2 mm. diam., connective gland inconspicuous; ovary 2-celled with several ovules in each cell.

Ripe *fruit* dark green slightly flushed dull purplish red at apex, oblong obovoid, obscurely ridged, c. 2 cm. long, apical umbilicus shallow, c. 3 mm. diam., bearing the 5 small incurved calyx lobes and style base; pericarp pithy leathery, c. 2 mm. thick; seed 1, testa thick, whitish pink, brittle crustaceous; cotyledons sessile, superposed, nearly equal, inner faces plane or slightly concave.

46. **Eugenia Helferi** Duthie in Hook. fil., F.B.I., II, 480 (1878); King, Mat. F.M.P., No. 12, 95; Ridl., F.M.P., I, 735. (Fig. 22*b*, *c*).

KEDAH: Bukit Dundang Forest Reserve, *Forest Dept. FMS 12425*.
PENANG: Pulau Jerejak, within 100 feet, *Kunstler 4181* (one sheet of this number in Herb. Calcutta is so labelled. All the other duplicates that I have seen bear a "Perak, Larut" label. The Penang locality is likely to be the correct one); Waterfall Gardens, *Curtis 3287, 3827, Haniff 1261, SFN 21405* (*Henderson*), *SFN 31575* (*Corner*), *SFN 37451* (*Nauen*); Government Hill, 500 feet, *Curtis 212;* Penang Hill, *SFN 35321* (*Kiah*), 2,000 feet, *SFN 37677* (*Nauen*).
Distrib: Burma, Siam.

A *tree*, trunk fluted at base; bark tesselately creviced into small rectangular pieces, scaling in small patches, not papery flaky, pinkish or greyish brown. *Twigs* terete or obscurely quadrangular, slender, bark pale brown, reddish brown or greyish, scaly. *Leaves* coriaceous, narrowly elliptic, elliptic oblong or ovate lanceolate or lanceolate, apex acuminate or acute, base cuneate or long narrowed, from c. 6 cm. × 1·5 cm. to c. 12 cm. × 5·5 cm., margin often wavy, thickened and cartilaginous; upper surface drying yellowish green or greenish brown, somewhat polished, lower surface duller and paler usually with black gland dots; midrib flat or very shallowly impressed above, elevate below; *primary nerves* up to c. 15 pairs in large leaves, spaced, slightly ascending, or more or less horizontal at leaf base, meeting a faint intramarginal nerve close to leaf margin, usually slightly elevate above, very faint or invisible, slightly elevate and faint below, secondaries and reticulations very faint; petiole slender, c. 1 cm. long, the leaf base decurrent upon it.

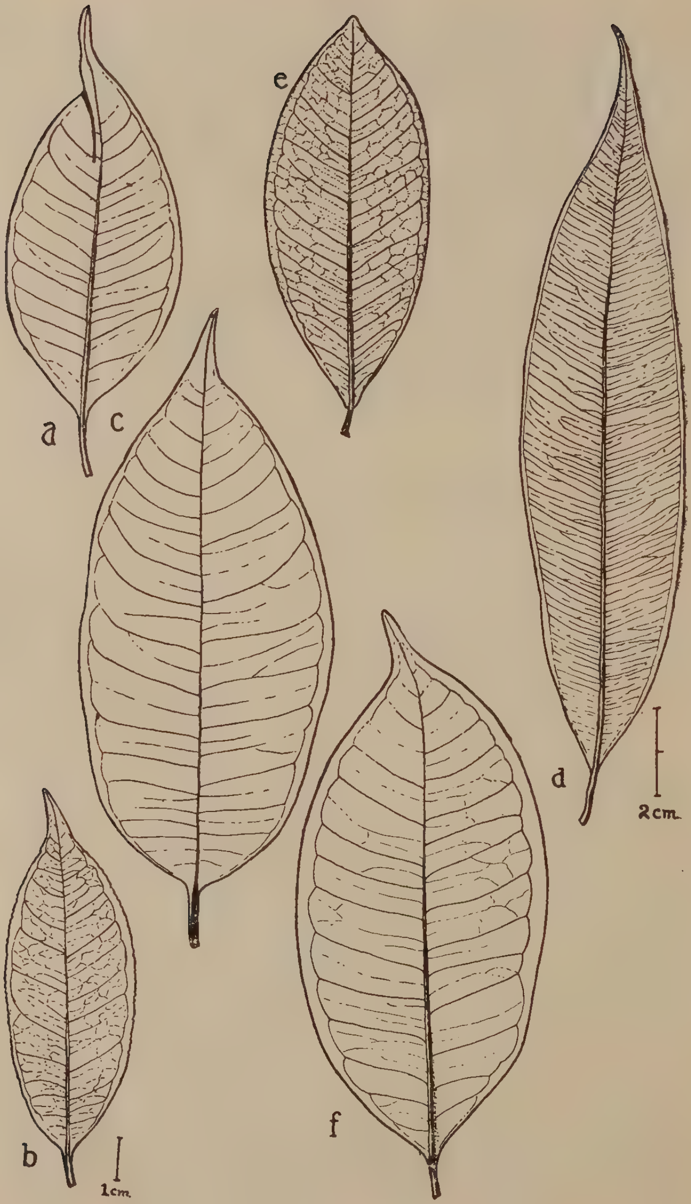
a
c
e
d
2cm
b
1cm
f

Fig. 22. a, *E. Ngadimaniana;* b, c, *E. Helferi;* d, *E. Græme-Andersoniæ;* f, *E. anisosepala.*

Panicles terminal or occasionally from uppermost axils, usually solitary, usually less than half length of leaves, but sometimes as long as them, spreading, shortly peduncled, branchlets short and rather crowded, rachis and branchlets with brown scaly flaky bark; *flowers* cream white, fragrant, sessile, usually in threes at branchlet ends, sometimes solitary, nearly 2 cm. across when expanded; buds clavate, 8–9 mm. long; *calyx* tube funnel shaped or narrowly campanulate, glandular, c. 6 mm. long, narrowed at base into a stout pseudostalk c. 1–1·5 mm. long; lobes 4, persistent, unequal, short, broad and rounded, the two outer c. 2–2·5 mm. across and 1 mm. tall, the two inner c. 3 mm. across and 1·5 mm. tall; *petals* 4, free, orbicular, c. 6 mm. diam., conspicuously gland dotted; *stamens* numerous, up to c. 1 cm. long, filaments subulate, slender, anthers oblong c. 0·5 mm. long, connective gland rather conspicuous; *style* much stouter than filaments, c. 6·5 mm. long; *ovary* 2-celled.

Fruit oblong or oblong globose, 1·6–2 cm. long and c. 1·5 cm. wide, almost white or pale greenish white with minute pale green dots, crowned by the 4 persistent, incurved, enlarged, fleshy calyx lobes; pericarp firm, not pulpy, sweet, c. 3–4 mm. thick; seed 1, testa adhering to cotyledons, brittle crustaceous; cotyledons conspicuously gland dotted, superposed, inner faces slightly concave, attached to hypocotyle near their centres by short stalks.

The pericarp of the ripe fruit is often partially nibbled away, perhaps by squirrels, the seed being left untouched with testa intact.

47. **Eugenia Graeme-Andersoniae** Ridl. in Journ. F.M.S. Mus., X, 134 (1920); F.M.P., I, 743. (Fig. 22*d*).

KELANTAN: banks of Chaning river, *Ridley s.n.* (type collection); Sungai Keteh, *SFN 12030* (*Nur*); Kuala Endong, *SFN 10162* (*Haniff*); Sungai Galas at Gua Musang, *SFN 22596* (*Henderson*).

PAHANG: Kuala Tahan, *Seimund* s.n.; Sungai Tahan, *Corner s.n.*

Distrib: Endemic.

A small *tree* with pendent branches. *Twigs* slender, the youngest quadrangular, the older terete and compressed below nodes, bark smooth, pale grey or pale brown. *Leaves* thinly coriaceous, deflexed, narrow oblong lanceolate, up to c. 17 cm. × 3·5 cm., apex long acuminate, base narrowed; upper surface drying greenish brown to blackish brown, dull, minutely punctate, lower surface paler, minutely glandular pustulate; midrib narrowly impressed above, prominent below; *primary nerves* fine, very numerous and close and parallel, ascending to a fine intramarginal nerve c. 1 mm. from leaf margin with another fainter loop very close to the margin; venation usually slightly elevate and visible above and below but more distinct below, the close reticulation visible below but finer than primaries; petiole slender, drying black, up to c. 1 cm. long.

Inflorescences axillary in axils of all leaves and terminal, short and erect, not exceeding c. 3 cm. long, branchlets short, angled, with dark bark; *flowers* usually in threes at branchlet ends, sessile, buds narrowly obovoid, 8–10 mm. long; *calyx* funnel shaped before anthesis, somewhat campanulate after, c. 6 mm. long, somewhat ridged, tapering to an obscure or distinct pseudostalk 1–2·5 mm. long; lobes 4, unequal, erect, persistent, the two outer triangular blunt, c. 1·5 mm. across base and 1 mm. tall, the inner ones broadly ovate rounded, c. 3 mm. across and 2 mm. tall; *petals* 4, free or falling in a loose calyptra but not agglutinated, broadly ovate orbicular, c. 4 mm. diam., sparsely but conspicuously gland dotted; *stamens* numerous, up to nearly 1 cm. long, filaments slender, subulate, anthers broadly elliptic, c. 0·4 mm. long, connective gland inconspicuous; *style* stouter than filaments and longer than them.

Fruit white when ripe, oblong ovoid, c. 2·5 cm. long and 1·5 cm. across, apical umbilicus deep, 4–5 mm. diam., fringed by the enlarged calyx lobes; pericarp pulpy, rather thick; seed 1, oblong ovoid, c. 1·6 cm. long, cotyledons nearly equal, superposed, gland pitted, inner faces conspicuously gland dotted, one slightly convex, the other slightly concave, attached to hypocotyle near their centres by short broad stalks.

A riverside tree or bush, distinctive in its long narrow deflexed leaves and short erect axillary inflorescences.

48. **Eugenia glauca** King, Mat. F.M.P., No. 12, 102 (1901); Ridl., F.M.P., I, 737.

PENANG: Penara Bukit, *Curtis 1152* (syntype); road to Spout, 700 feet, *Curtis 2228* (syntype), *2778*.
DINDINGS: Lumut, *Ridley 3086* (syntype).
MALACCA: Bukit Bruang, *Derry 1104* (syntype); Sungai Udang, *Derry 1238;* sine loc., *Griffith K.D. 2416.*
JOHORE: foot of Gunong Panti, *Corner s.n.*
SINGAPORE: Bukit Timah, *SFN 33563, 34954* (*Corner*), *SFN 35941* (*Ngadiman*), *SFN 34780, 34789, 35945, 35946, 36180* (*Henderson*).
Distrib: Endemic.

A *tree* reaching c. 45 m. tall but usually less, with slight buttresses; bark nearly smooth or longitudinally creviced, or in very large trees slightly fissured, pustulate, scaling off in long irregular pieces, pinkish buff or dull greyish brown to reddish brown; inner bark thick, pale pinkish brown to dark pinkish red. *Twigs* slender, terete, with brown or red flaky bark. *Leaves* coriaceous, oblong lanceolate, oblong ovate, oblanceolate, obovate or elliptic, variable in size, up to c. 11 cm. × 5 cm., apex blunt or with a short blunt point, base cuneate; upper surface drying olivaceous or reddish or blackish brown, polished, the lower glaucous in life and usually also when dry; midrib flat above or slightly impressed, or slightly raised and channelled, elevate below; *primary nerves* up to c. 15 pairs, spaced, fine but elevate on both surfaces but more distinct below, ascending rather irregularly to a fine intramarginal nerve c. 1–2 mm. from leaf margin; secondaries and reticulations usually visible above, distinct below and often hardly distinguishable from primaries; petiole drying black, up to c. 6 mm. long.

Inflorescences few flowered, terminal and axillary, of clustered racemes or few-branched panicles, up to c. 10 cm. long, rachis and branchlets slender, angled and compressed, with dark striate bark; *flowers* sessile, in threes at ends of branchlets, or solitary, buds globose clavate, 7–8 mm. long; *calyx* after anthesis widely campanulate, c. 7 mm. long and 5 mm. across mouth, narrowed abruptly into a slender pseudostalk c. 3 mm. long; lobes 4, quickly deciduous, rather thick, transversely oblong ovate, c. 3 mm. across and 2 mm. tall; *petals* 4, free, ovate orbicular, rather thick textured, c. 5 mm. diam., reflexed after anthesis; *stamens* numerous, c. 7 mm. long, filaments slender, subulate, broadened at base, anthers oblong elliptic, c. 0·6 mm. long, connective gland inconspicuous; *style* much stouter than filaments, c. 10 mm. long; *ovary* 2-celled with few ovules in each cell.

Fruit green when ripe, more or less globose, oblong globose or slightly pyriform, c. 2·5–2·75 cm. diam., faintly vertically ridged, apical umbilicus shallow, c. 4 mm. diam., the calyx rim very short, without calyx lobes; pericarp 2·5–5 mm. thick; seed 1, more or less depressed globose, c. 2 cm. diam., testa rather thick, rather brittle, adhering closely to the smooth shining surface of cotyledons; cotyledons nearly equal, superposed, inner faces pale, gland dotted, nearly plane, sessile, attached to hypocotyle near periphery of seed.

E. glauca King var. **pseudoglauca** King, Mat. F.M.P., No. 12, 102 (1901). *E. pseudoglauca* Ridl., F.M.P., I, 737 (1922).

DINDINGS: Lumut, *Ridley 8386* (syntype), *Ridley s.n.;* Pulau Sembilan, *Ridley 3108* (syntype); Pangkor Island, *Curtis 3440* (syntype), *Forest Dept. FMS 10208;* sine loc., *Forest Dept. FMS 1603.*

PERAK: Pulau Lallang, *Seimund s.n.*

JOHORE: Pulau Setindan, off Mersing, *SFN 32232* (*Corner*).

Distrib: Endemic.

In the herbarium the only distinguishing point between the typical form and the variety is the non-glaucous lower surface of the leaf of the latter. The typical form tends to have less acuminate and more obovate leaves, but there is a great variation in the leaf shape in both forms and some collections of the variety have leaves almost indistinguishable from those of the typical form, except that they are not glaucous. There are, however, certain differences in the barks of the two forms. That of the typical form is described above. The variety has rather deeply irregularly fissured and flaky bark, fawn brown to greyish brown; inner bark brown to purplish-pink-brown.

49. **Eugenia anisosepala** Duthie in Hook. fil., F.B.I., II, 481 (1878), pro parte; King, Mat. F.M.P., No. 12, 96, pro parte; Ridl., F.M.P., I, 736. (Fig. 22*f*).

KEDAH: Gurun, *Forest Dept. FMS 9021.*
SELANGOR: Ginting Simpah, *Forest Dept. FMS 10246;* Ginting Bidai, *Ridley s.n.*
MALACCA: Sungai Udang Reserve, *Derry 289;* sine loc., *Griffith K.D. 2380, Maingay K.D. 753* in part (type collection).
NEGRI SEMBILAN: Sungai Raya, *Forest Dept. FMS 573;* Pasir Panjang, *Forest Dept. FMS 580.*
PAHANG: Kuantan, *Forest Dept. FMS 6656.*
Distrib: Endemic.

A *tree. Twigs* slender to rather stout, terete, compressed below nodes, bark smooth, greyish or brownish. *Leaves* coriaceous, elliptic or oblong lanceolate, up to c. 11 cm. × 5·5 cm., apex acuminate, base cuneate; upper surface somewhat polished, drying dark brown, sparsely glandular pustulate, lower surface reddish or dark brown; midrib impressed above, prominent below; *primary nerves* up to c. 14 pairs, spaced, fine and slightly elevate above, fine and usually quite distinct below, curving up to a fairly distinct intramarginal nerve c. 3 mm. from leaf margin; secondaries and reticulations usually visible above and distinct below but finer than primaries; petiole rather slender, up to c. 6 mm. long.

Panicles terminal, corymbose, usually shorter than leaves but reaching c. 10 cm. long, branchlets numerous, spreading-ascending, rather stout, angled and compressed with smooth bark; *flowers* sessile, usually in threes at the ends of the short ultimate branchlets, rather crowded, buds clavate, c. 8–10 mm. long; *calyx* more or less campanulate or funnel shaped, nearly 10 mm. long, contracted below into a pseudostalk 3–4 mm. long; lobes 4, unequal, subpersistent, the two outer broad and rounded, c. 3 mm. across and 2·5 mm. tall, the two inner subpetaloid, thinner, suborbicular, c. 4–4·5 mm. diam.; *petals* 4, free, ovate orbicular, c. 4–4·5 mm.

diam.; *stamens* numerous, filaments slender, broadened at base, up to c. 6–7 mm. long, anthers broadly oblong, c. 0·5 mm. long, without connective gland; *style* stouter than filaments, c. 8 mm. long; *ovary* 2-celled. *Fruit* unknown.

Not a very well known species, but distinguishable by its corymbose panicles with rather stout and smooth barked branchlets, and the subpetaloid inner calyx lobes.

Maingay K.D. 754 in Herb. Calcutta has been written up by Duthie as *E. anisosepala.* It is *E. Griffithii* Duthie. On the sheet in Herb. Calcutta a pencilled field note reads "a very large tree". This remark is attributed by Duthie to Griffith. There is obviously some confusion in the original diagnosis of the species and also in the Materials, for King cities *Maingay K.D. 754* as well as *Maingay K.D. 753* (in part). This latter citation is correct, for the K.D. number was given to two specimens of Maingay's collecting, *Maingay 1558* which is *E. anisosepala* and *Maingay 3012* which is *E. laevicaulis* Duthie.

50. **Eugenia Kiahii** Henderson in Gardens' Bulletin, Singapore, XI, 307, fig. 5 (1947).

JOHORE: Sungai Kayu, Mawai-Jemaluang road, *SFN 32036* (*Kiah*), *SFN 29400* (*Corner*).

Known only from these collections in the fresh water swamp forests of South Johore.

A *tree* c. 12 m. tall, twigs stout, terete, with smooth, sometimes polished, grey brown or pale brown or greyish white bark. *Leaves* very coriaceous, ovate or orbicular, broadly ovate oblong, broadly elliptic, or elliptic oblong, up to c. 10 cm. long and 9 cm. broad, base very shortly cuneate, or rounded and very shortly and abruptly narrowed on to petiole, apex rounded or shortly and bluntly acute or apiculate; petiole c. 1 cm. long; midrib impressed above, elevate below; *primary nerves* fine, raised on both surfaces, slightly less conspicuous above than below, about 7-10 pairs, meeting in an intramarginal loop 3–5 mm. from margin, secondaries and reticulations raised on both surfaces and almost as distinct as primaries.

Inflorescences short and dense, terminal, on stout peduncles c. 2·5 cm. long; peduncles and rachis as stout as twigs, more or less compressed, secondary branchlets also stout and angled, c. 1·5 cm. long, the flowers crowded at their apices or on tertiary branchlets c. 3 mm. long. *Flower* buds obovoid, c. 7–8 mm. long, *calyx* narrowly campanulate, narrowed rather abruptly to a stout pseudostalk; calyx tube including pseudostalk 5–6 mm. long, lobes 5, distant, triangular ovate blunt, c. 1 mm. tall; *petals* calyptrate, leathery; *stamens* 3·5–4 mm. long, anthers c. 0·4 mm. diam., connective gland dark brown, conspicuous; *ovary* 1-2-locular, multiovulate; *fruit* unknown.

A species characterised by the broad thick leaves with well marked venation and the stout densely flowered panicles.

E. Kiahii Henderson var. **angustifolia** var. nov. (Fig. 23).

A typa foliis tenuioribus, angustioribus, inflorescentiis maioribus, ramis paniculae gracilioribus, floribus leviter minoribus differt.

JOHORE: Sungai Sedili, *SFN 36921* (*Ngadiman*), TYPE collection, holotype in Herb. Singapore; Pengkalan Raja peat forest, Pontian, *SFN 36668* (*Ngadiman*).

At first sight this variety looks very different from typical *E. Kiahii* in the narrower leaves drying paler, the larger inflorescence with much more slender branchlets, and in the slightly smaller flowers, but the flowers correspond closely in shape and structure with those of the typical form, and the venation in both forms is very similar. *SFN 36668* from the peat forest at Pontian is in very young fruit, the flowers having lost their petals and stamens and the ovary beginning to swell up. The inflorescence branchlets of this collection are appreciably stouter than those of the type, and the flowers apparently not so crowded.

According to the field note the type collection of the variety is a tree of 90 ft. tall, stilt-rooted ("jangkang"), flowers white. A small bark specimen shows a smooth dull red or greyish brown bark about 5–6 mm. thick with the outer layers thinly papery flaky.

51. **Eugenia Burkilliana** King, Mat. F.M.P., No. 12, 94 (1901); Ridl., F.M.P., I, 735. (Fig. 24*c*).

PERAK: Asam Kumbang, *Wray 2785* (syntype); Taiping, *Wray 3070* (syntype); Gopeng, 500–800 feet, *Kunstler 4719* (syntype), 300–500 feet, *Kunstler 6186* (syntype).
Distrib: Endemic.

A *tree* up to c. 18 m. tall. *Twigs* terete or obscurely quadrangular with raised lines on the angles, bark nearly smooth, or striate, brownish or blackish brown. *Leaves* coriaceous, oblong lanceolate, up to c. 10 cm. × 3·5 cm., apex acuminate, base cuneate; upper surface drying greenish brown or pale brown, somewhat polished, minutely and closely punctate, lower surface about the same colour, with raised black gland dots; midrib impressed above, elevate below; *primary nerves* about 10 pairs, fine, spaced, ascending, meeting in a rather irregularly looped intramarginal nerve 3–5 mm. from leaf margin, with another

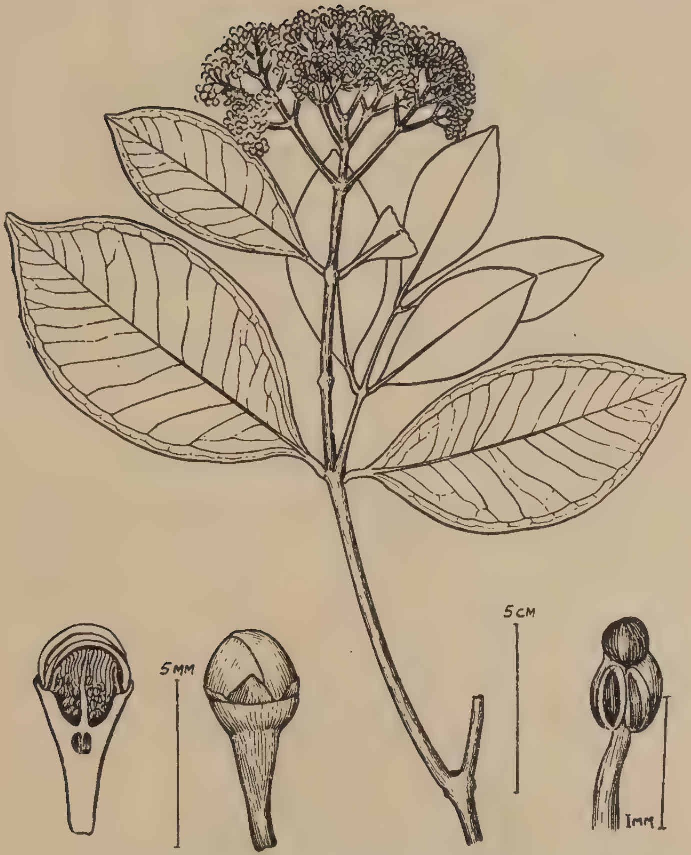

Fig. 23. *E. Kiahii* var. *angustifolia.*
Del: Chan York Chye.

much fainter one about 1 mm. from margin; secondaries and reticulations quite distinct but distinguishable from primaries; all the venation elevate and distinct on both surfaces; petiole slender, up to c. 1·2 cm. long.

Panicles terminal, almost or quite sessile, much branched from near base, many flowered, c. 4 cm. long and 6 cm. diam., branchlets ascending, 4-angled and compressed, with brown bark, the primary branchlets rather stout, the secondary thinner; *flowers* white, in threes at ends of short tertiary branchlets, the outer flowers of the triads usually shortly pedicellate and the centre one sessile, buds clavate, c. 1 cm. long; *calyx* funnel shaped, 8–10 mm. long, striate, c. 4 mm. across mouth, gradually narrowed to a pseudostalk c. 3 mm. long; lobes 4, persistent, slightly unequal, bluntly rounded triangular, the larger c. 3 mm. across and 2 mm. tall, thick textured, sparsely but conspicuously gland dotted; *petals* 4, free, orbicular, 4–4·5 mm. diam., thin textured, with a few large gland dots; *stamens* numerous, up to c. 11 mm. long, filaments slender, subulate, anthers very small, ovate, c. 0·3 mm. long, connective gland conspicuous; *style* considerably stouter than filaments, c. 4·5 mm. long. *Fruit* unknown.

The following fruiting specimen may belong here. It differs in having a longer and laxer inflorescence and paler bark on the twigs:

PERAK: Kota, *Wray 1954.*

E. Burkilliana King var. **garcinifolioides** var. nov. (Fig. 24*a*).

A typa inflorescentiis laxioribus longioribusque, foliis multo maioribus (ad 18 cm. longis et 8·5 cm. latus) distinguenda.

PAHANG: Rompin, *Forest Dept. FMS 15421*, TYPE collection in Herb. Kepong.
Distrib: Endemic.

This variety has exactly the leaves of *E. garcinifolia* King, but the flowers are those of *E. Burkilliana.*

52. **Eugenia Duthieana** King, Mat. F.M.P., No. 12, 103 (1901); Ridl., F.M.P., I, 731. (Fig. 25*a*).

In hill forest in Kedah, Penang and Perak, up to 4,300 feet, and in lowland forest in the south of the Peninsula from Malacca and Pahang to Singapore. Endemic.

A *tree* up to c. 21 m. tall, trunk very slightly fluted at base or narrowly buttressed to c. 1·5 m.; bark smooth or pustulate over large areas or with longitudinal crevices, flaking in long pieces, pale reddish brown to warm brown; inner bark rather thick, fibrous and dimpled where exposed by stripping of outer layers, sometimes with a green layer immediately below outer layer, reddish brown or reddish buff; wood pale buff. *Twigs* rather slender, terete, with brownish or greyish somewhat flaky bark. *Leaves* coriaceous, elliptic, elliptic lanceolate or ovate elliptic, apex acuminate or caudate acuminate, base cuneate, up to c. 15 cm. × 6·5 cm., upper surface drying dull, pale brown to blackish brown, smooth, lower surface brown or reddish brown, usually paler than upper; midrib narrowly impressed

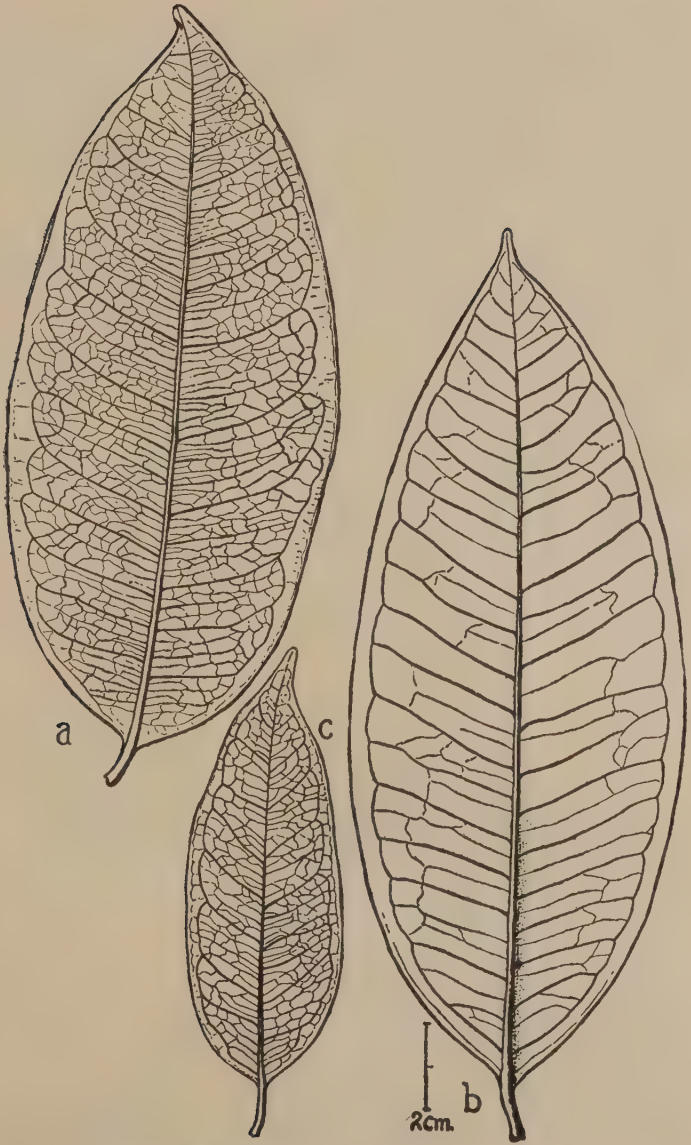

Fig. 24. a, *E. Burkilliana* var. *garcinifolioides;* b, *E. Griffithii;* c, *E. Burkilliana.*

above, elevate below; *primary nerves* up to c. 8 pairs, 1–2 cm. apart, impressed above and very faint, slender but elevate and distinct below, ascending and curving slightly up to a well marked intramarginal nerve far from leaf margin (4–7 mm.), with a much fainter loop closer to margin; secondaries and reticulations very faint or invisible above, slightly raised below but much less distinct than primaries; petiole c. 5–7 mm. long, the leaf blade decurrent upon it.

Inflorescences terminal, of clustered or solitary racemes up to c. 7 cm. long, the rachis slender, 4-angled, with black bark; *flowers* white, few, sessile, one or two pairs of flowers on the rachis with 3 or sometimes 5 terminal ones, buds clavate, c. 7 mm. long; *calyx* after anthesis rather widely funnel shaped, c. 5 mm. long, ridged, tapered to a pseudostalk c. 1·5 mm. long; lobes 4, subpersistent, broadly ovate rounded, c. 2–3 mm. across and 1·5–2 mm. tall; *petals* 4, free, orbicular, rather thick textured with thin margins, c. 3 mm. diam.; *stamens* numerous, filaments slender, subulate, up to 5–6 mm. long, anthers oblong elliptic, c. 0·5 mm. long, connective gland small; *style* much stouter than filaments, c. 7 mm. long; *ovary* 2-celled.

Fruit globular or slightly pyriform, c. 2 cm. long, rugulose when dry, apical umbilicus wide and shallow, c. 5 mm. diam., with the exceedingly short calyx rim without remains of calyx lobes; pericarp very thick, seed 1, more or less globose, inner cotyledon faces nearly plane, attached to hypocotyle by short stalks.

53. **Eugenia Griffithii** Duthie in Hook. fil., F.B.I., II, 481 (1878); King, Mat. F.M.P. No. 12, 92; Ridl., F.M.P., I, 731. *Syzygium Griffithii* (Duthie) Merr. and Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 174 (1939). *E. Valetoniana* King, Mat. F.M.P., No. 12, 112 (1901). *E. subrufa* King, Mat. F.M.P., No. 12, 102 (1901), et var. *robusta* King, loc. cit., 103; Ridl. F.M.P., I, 733. (Fig. 24*b*).

Rather widely distributed in lowland and hill forest from Penang to Singapore.
Distrib: Borneo.

A *tree* up to c. 24 metres tall, bark greyish or pale pinkish greyish buff, slightly cracked or creviced; inner bark pinkish. *Twigs* slender, terete, with brown and rather flaky bark. *Leaves* coriaceous, narrowly elliptic or oblong elliptic, apex acute or shortly acuminate, base broadly or narrowly cuneate, up to c. 19 cm. long and 7·5 cm. broad, purple when young; upper surface drying brown to blackish brown, more or less polished, often punctate, lower surface brown; midrib impressed above, elevate below; *primary* *nerves* up to c. 15 pairs, 1–1·5 cm. apart, spreading ascending, meeting a distinct intramarginal nerve c. 3–5 mm. from leaf margin, impressed or slightly elevate or very obscure above, usually prominent below, sometimes rather fine and faint, secondaries below usually distinct but much finer than primaries, reticulations very fine to almost invisible; petiole up to nearly 1 cm. long.

Inflorescences rather variable, terminal or axillary, often clustered, of lax racemes or panicles, reaching c. 17 cm. long but usually much less, rachis and branchlets slender, dark coloured, compressed and angled; the racemes with distant clusters of flowers, the panicles with distant slender branchlets up to c. 3 cm. long, the flowers clustered at their ends; *flowers* sessile, white or pale green with white stamens, buds globose clavate c. 1 cm. long; *calyx* rather narrowly campanulate, c. 1 cm. long, rather abruptly narrowed into a pseudostalk more than half its length; lobes 4, unequal, deciduous, the two outer thick textured, very broad and rounded, c. 3 mm. across and 1·5 mm. tall, the two inner thinner, subpetaloid, gland dotted, overlapping in bud, c. 4·5 mm. across and 3 mm. tall; *petals* 4, free, ovate orbicular, sparsely but conspicuously gland dotted, 4–5 mm. diam.; *stamens* numerous, filaments slender, subulate, up to c. 7 mm. long, anthers elliptic oblong, c. 0·6 mm. long, connective gland small; *ovary* 2-celled.

Fruit more or less globose, c. 2 cm. diam., corrugate-rugulose when dry, apical umbilicus c. 4 mm. diam., fringed by the very short calyx rim, without calyx lobes; pericarp very thick, seed 1, cotyledons side by side, nearly equal, inner faces gland dotted, nearly plane, attached to the hypocotyle near their centres by short stalks.

The material which I have placed here constitutes perhaps an assemblage of plants rather than a well marked species. The material available is not very good and the description has been made from sheets which match most closely the type. *E. Griffithii* is perhaps nearest to *E. Duthieana* but differs in the leaves being longer in proportion to their width, with more primary nerves, in the tendency of the inflorescence to branch and become paniculate and in the longer pseudostalk of the calyx.

54. **Eugenia Thumra** Roxb., var. **penangiana** King, Mat. F.M.P., No. 12, 92 (1901); Ridl., F.M.P., I, 734. (Fig. 25*b*).

PENANG: Highlands, *Curtis 3601;* Waterfall, *Curtis 2410* (type collection); Penang Hill, *Nauen s.n.*

A medium sized *tree*. *Twigs* slender, quadrangular or more or less terete with raised lines between the nodes, bark

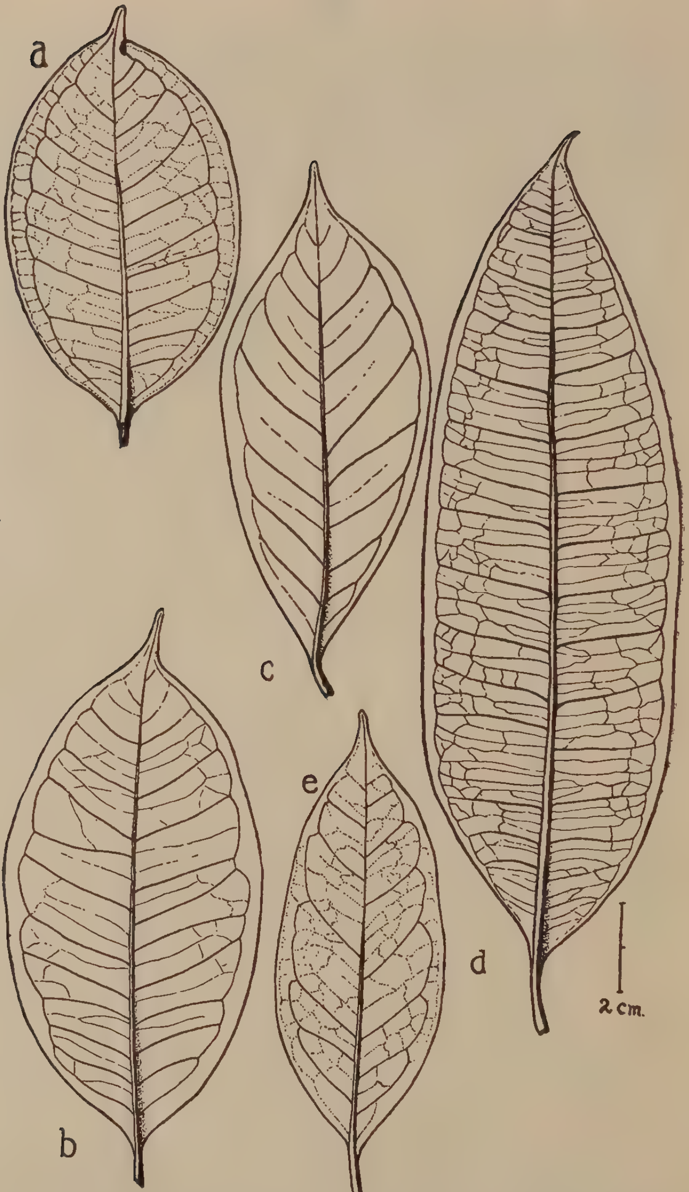

Fig. 25. a, *E. Duthieana;* b, *E. Thumra* var. *penangiana;* c, *E. Swettenhamiana;* d, *E. subhorizontalis;* e, *E. Ridleyi.*

of youngest shoots dark and smooth, that of older parts brownish or greyish, rough. *Leaves* coriaceous, elliptic, oblong elliptic, or oblong lanceolate, up to c. 13 cm. × 6 cm., apex acute or subacute or shortly and abruptly acuminate, base cuneate and narrowed on to petiole; upper surface drying lead brown to blackish brown, dull, minutely pustulate, lower surface dark brown, closely pustulate; midrib narrowly impressed above, prominent below and pustulate; *primary nerves* 8–9 pairs, finely impressed and faint above, rather prominent below, ascending and curving up slightly or running straight to a well marked shallowly looped intramarginal nerve c. 4–5 mm. from leaf margin, with an exceedingly faint series of loops close to the margin; secondaries and reticulations invisible above, secondaries below not so prominent as primaries, reticulations lax and very faint; petiole rather stout, drying black and wrinkled, c. 1 cm. long.

Panicles terminal and axillary, clustered or solitary, peduncled, up to c. 14 cm. long, branchlets 1–3 pairs, spreading, slender, they and the rachis 4-angled or compressed; *flowers* white, clustered at ends of branchlets, or at ends of shorter secondary branchlets; buds globose clavate, 5–6 mm. long; *calyx* funnel shaped, c. 5 mm. long, more or less ridged, contracted rather abruptly into a pseudostalk c. 2·5 mm. long; lobes 4, ?subpersistent, very unequal, the two outer thick, broad, rounded, c. 2 mm. across and 1 mm. tall, the two inner subpetaloid, overlapping in bud, thin, broadly ovate orbicular retuse, c. 4 mm. diam.; *petals* 4, free, ovate orbicular or ovate triangular, c. 4 mm. across; *stamens* numerous, up to c. 6 mm. long, filaments slender, subulate, wrinkled, anthers broadly oblong or oblong elliptic, 0·5–0·6 mm. long, connective gland conspicuous; *style* much stouter than filaments, c. 5 mm. long; *ovary* 2-celled. *Fruit* unknown.

I have seen no authentic material of *E. Thumra* Roxb., and so have accepted King's placing of our plant. I have examined a series of specimens placed under *E. Thumra* in Herb. Dehra Dun and these agree well with our plant in inflorescence and flower characters but differ in having the primary nerves raised above, not sunk, and in the terete twigs without raised lines between the nodes. Our plant appears close to *E. Griffithii* Duthie and *E. Ridleyi* King but differs from both in the venation and in having raised lines on the twigs, and from the former in the larger and more branched inflorescence and smaller flowers.

55. **Eugenia Swettenhamiana** King, Mat. F.M.P., No. 12, 126 (1901), pro parte, **emend.** (Fig. 25*c*).

PERAK: near Gunong Pondok, 500–800 feet, *Kunstler 7590* (lectotype).

Arbor 18–21 m. alta. *Ramuli* tereti, cortice pallide fusco. *Folia* oblanceolata, 10–11 cm. longa, c. 4 cm. lata, apice breviter et obtuse acuminata, basi sensim ad petiolum attenuata; costa media supra impressa subtus prominente, *nervis primariis* utrinque c. 6-8, supra impressis, subtus prominulis, inter se c. 1 cm. distantibus, vena intramarginali a margine 3–5 mm. remota conjunctis; petioli 5–6 mm. longi. *Paniculae* terminales, 2–4 fasciculatae pedunculatae, 5–8 cm. longae, ramulis laxis ad 1 cm. longis. *Flores* in apice ramulorum 3 vel 1, sessiles vel pedicellati. *Calycis* tubus infundibuliformis, brevistipitatus, ad 4 mm. longus, lobis 4 late rotundis c. 2 mm. diam. *Petala* 4, libera, calycis lobis sub-aequalia.

King included two distinct species here and one of them, represented by Scortechini's collection, was redescribed by Ridley as *E. cordifoliata*. Ridley, in a note in F.M.P., I, p. 755, points out that King's species is a mixture and that the portion that he rejects does not appear to be a Myrtaceous plant (there is an obvious *lapsus calami* in this note, for Ridley refers to Scortechini's plant when he means that collected by Kunstler).

Kunstler's specimens are certainly not good, the flowers being in bud and somewhat crushed, but enough of the structure can be made out to be certain that they represent a species of *Eugenia* which has the same shape of calyx tube and the same large rounded sepals and free petals as *E. cordifoliata*. The latter, however, has larger flowers and leaves with cordate, not narrowed bases.

King's description was based mostly on Kunstler's specimens, but also to some extent on Scortechini's, and a new description has therefore been made.

56. **Eugenia subhorizontalis** King, Mat. F.M.P., No. 12, 112 (1901); Ridl., F.M.P., I, 733. (Fig. 25*d*).

PERAK: Asam Kumbang, *Wray 2118* (syntype); Taiping, *Wray 2097* (syntype).
NEGRI SEMBILAN: Sungai Raya, *Forest Dept. FMS 573.*
Distrib: Siam, Bangka, Sumatra (fide King).

A small *tree*. *Twigs* slender, terete, smooth, blackish brown when dry. *Leaves* thinly coriaceous, oblong or elliptic oblong, apex shortly acuminate, base cuneate and decurrent on petiole, margins more or less recurved, 8–18 cm. long and 3·5–6 cm. broad, upper surface drying olivaceous to blackish brown, somewhat polished, lower surface brown or reddish brown, dull; midrib impressed above, prominent below; *primary nerves* up to c. 20 pairs 0·5–1 cm. apart, very fine and impressed above, fine below but elevate and distinct, subhorizontal, curving slightly up to a distinct intramarginal nerve c. 2–4 mm. from leaf margin; secondaries and reticulations very faint above, slightly impressed, elevate below and rather distinct; petiole up to c. 1·5 cm. long.

Panicles terminal and axillary, lax, up to c. 8–9 cm. long, branchlets few, distant, spreading-ascending, slender and compressed with dark striate bark; *flowers* white, sessile, in clusters of 3–6 at branchlet ends, not crowded, buds globose clavate to obovoid, c. 8–10 mm. long; *calyx* funnel shaped, 6–8 mm. long, narrowed at base to a pseudostalk 2–3 mm. long; lobes 4, nearly equal, broad and rounded, c. 2 mm. across and 1 mm. tall; *petals* calyptrate, more or less agglutinated; *stamens* numerous, filaments slender, subulate, c. 5 mm. long, anthers oblong, c. 0·5 mm. long, connective gland inconspicuous; *style* stout at base, tapering upwards, c. 4 mm. long. *Fruit* unknown.

No expanded flowers of this species have been seen and the material available is scanty. The subhorizontal primary nerves and the lax and rather long inflorescences with slender branchlets are distinguishing points.

57. **Eugenia Ridleyi** King, Mat. F.M.P., No. 12, 98 (1901); Ridl., F.M.P., I, 735; Corner, Wayside Trees of Malaya, p. 503, fig. 168. (Fig. 25*e*).

Widely distributed from Kedah to Singapore but apparently nowhere very common except in Singapore.
Distrib: Siam (fide Craib).

A *tree* up to c. 30 m. tall, without buttresses; bark irregularly fissured, flaking in thick irregular pieces, not papery flaky, light brown or buff-red; inner bark thick, fibrous, dark red with dark red sap; wood rather soft, pale buff. *Twigs* slender, terete, the youngest with smooth, almost black bark, the older with greyish or brownish smooth or slightly rough bark. *Leaves* deep blue when young, thinly coriaceous, ovate lanceolate or oblong lanceolate, apex acuminate, base cuneate, from c. 8 cm. × 3 cm. to 18 cm. × 6 cm.; upper surface dull, drying dark brown to blackish brown, minutely punctate, lower surface paler brown, sometimes glandular pustulate; midrib impressed above, prominent below; *primary nerves* 6–10 pairs, 1–2 cm. apart, very slightly raised and channelled above, faint, prominent below, ascending and curving upwards to form a well marked looped intramarginal nerve c. 4–10 mm. from leaf margin, with a very faint loop close to margin, secondaries below almost as prominent as primaries, reticulations lax, usually very faint; petiole usually c. 1 cm. long.

Panicles terminal and axillary, often clustered, up to c. 8 cm. long, usually shortly peduncled, branchlets distant, 2–3 pairs, spreading, they and rachis slender, angled and compressed, with dark bark; *flowers* clustered at branchlet ends, buds globose clavate, c. 7 mm. long and 6 mm. across; *calyx* broadly funnel shaped, abruptly tapered to a pseudostalk 1–2 mm. long, green with minute pale gland dots; lobes 4, pale green, broadly ovate rounded, c. 4 mm. across at base and 2 mm. tall, reflexed after anthesis, persistent; *petals* 4, falling as a calyptra but not agglutinated and very easily separable, pale green with paler margins, more or less orbicular, c. 4 mm. diam.; *disc* green with thickened corrugate inner margin; *stamens* numerous, filaments slender, subulate, green, c. 5 mm. long, anthers very small; *style* subulate, green, stouter than filaments, c. 5 mm. long, tapering upwards from a stout pale conical base; *ovary* 2-celled with several ovules in each cell.

Fruit when ripe dull green slightly flushed brownish red, globose or ovoid, occasionally somewhat obovoid, up to c. 2 cm. diam., apical umbilicus shallow and wide, c. 8–9 mm. diam., with the 4 incurved somewhat enlarged and fleshy broad blunt calyx lobes on its margin, and style base; pericarp white, fleshy, slightly juicy, slightly sweet, c. 3 mm. thick; seed more or less globular, c. 1·5 cm. diam., testa pale green, thick, pithy and juicy, adhering strongly to the irregular surface of the cotyledons; cotyledons pale green, more or less equal, stalked, hypocotyle large, cylindrical, pink, lying in a groove and reaching almost to the periphery of the seed.

The green flowers and deep blue young leaves make this species a distinct one in the field.

58. **Eugenia Dyeriana** King, Mat. F.M.P., No. 12, 88 (1901), et var. *oblonga* King, loc. cit.; Ridl., F.M.P., I, 732. *E. Clarkeana* King, loc. cit., 93. *E. corrugata* King, loc. cit., 93; Ridl., F.M.P., I, 732. (Fig. 26).

Common from Kedah to Johore in lowland and hill forest, common in Perak from sealevel to 4,000 feet, and in hill forest at Cameron Highlands, Pahang.
Distrib: Lower Siam.

A *tree* up to c. 22 m. tall. *Twigs* rather stout, terete, smooth, bark brownish or greyish, the youngest shoots compressed, with dark bark. *Leaves* thickly coriaceous, elliptic, elliptic oblong or oblong, apex acute or shortly and abruptly acuminate, base cuneate or abruptly narrowed on to petiole, usually large, up to c. 26 cm. × 10 cm., upper

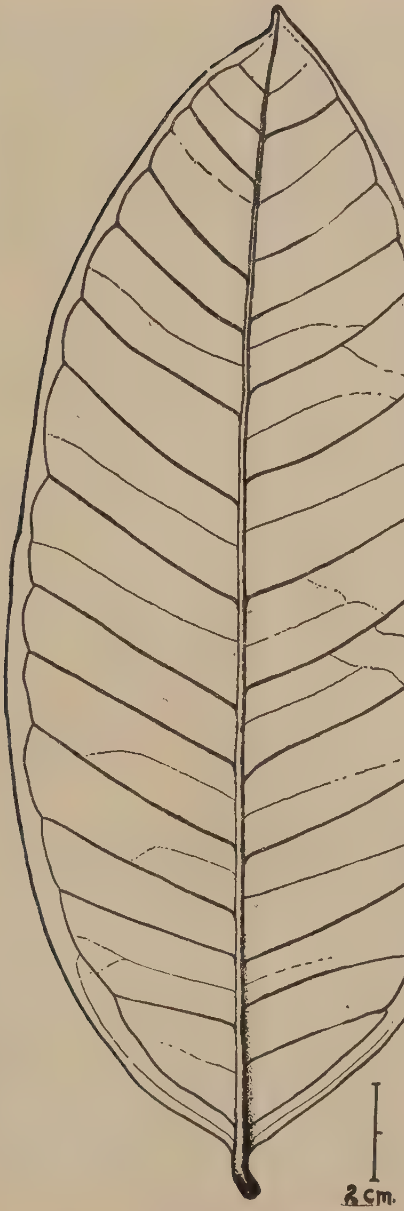

Fig. 26. *E. Dyeriana.*

surface drying dark to blackish brown, more or less polished, sometimes minutely punctate, lower surface warm red brown, more or less shining; midrib shallowly impressed above, prominent and rounded below; *primary nerves* up to c. 20 pairs, spaced, impressed above, often inconspicuous, bold below and drying dark, ascending and running straight or curving up to a bold shallowly looped intramarginal nerve 4–6 mm. from leaf margin; secondaries and reticulations usually very faint or invisible above, faint below, but if distinct, always much less prominent than primaries; petiole stout, up to c. 1 cm. long, widely channelled above.

Panicles terminal or axillary, often clustered, variable in length but nearly always shorter than leaves, reaching 15 cm., but usually not more than 9–10 cm., usually pedunculate, rachis usually rather stout, 4-angled, with dark bark, bearing usually about 2 pairs of short stout compressed, spreading and distant branchlets; *flowers* crowded at branchlet ends, sessile, buds obovoid, c. 7 mm. long; *calyx* after anthesis widely funnel shaped, c. 6 mm. long, slightly contracted near base into a very stout obscure pseudostalk; lobes 4, deciduous, unequal, the outer two very thick textured, transversely oblong, c. 5 mm. broad and 3 mm. tall, inners subpetaloid, thinner textured, suborbicular, c. 5 mm. diam.; *petals* 4, free, orbicular, c. 6 mm. diam., gland dotted; *stamens* numerous, filaments slender, subulate, reaching c. 1 cm., anthers elliptic or oblong elliptic, almost 1 mm. long, connective gland conspicuous; *style* stouter than filaments, c. 7 mm. long; *ovary* 2-celled, multiovulate.

Fruit globular to depressed globular, smooth or vertically ridged or corrugate, up to c. 6 cm. diam., apical umbilicus small, with a very short calyx rim without remains of calyx lobes; seeds 1–5.

Ridley reduced *E. Clarkeana* King to this species, I believe correctly, although Craib, Fl. Siam. Enum., I, 635, retains it provisionally. *E. corrugata* King is a little known plant described from fruiting specimens and I believe it to be merely *E. Dyeriana* with ripe fruit. The material shows considerable differences in size and ridging of the fruits, depending partly on their age, but two fruiting specimens from Cameron Highlands, both with ripe fruit (picked up from the ground but collected by an experienced native collector), show that the fruit may be almost smooth, or with only very faint, or well marked vertical ridges and corrugations. The largest fruits, which may be 6 cm. diam., and are usually depressed globular, may contain 3 or 5 seeds. Småller fruits c. 2–2·5 cm. diam., on the same individual, apparently also ripe, may contain but one seed. Very young fruits may be either smooth or vertically ridged.

Fruit of *Forest Dept. FMS 12112* is c. 3 cm. diam., depressed globose, smooth or faintly vertically ridged, crowned by short remains of calyx tube; pericarp thick, tough, 5 mm. or more; seed 1, cotyledons very unequal, the larger with a triangular recess into which the other fits.

Fruit of *Kunstler 6822* depressed globose, cotyledons equal, point of attachment to hypocotyle close to periphery, opposing faces concave, not interlocking.

Seed of *SFN 32829* more or less hemispherical, c. 1·5 × 2·5 cm., cotyledons nearly equal, inner faces nearly plane, not interlocking, cotyledons sessile, point of attachment c. 3 mm. from periphery. In a large 2-seeded fruit the testa was found to be very thick, adhering closely to the cotyledons, the inner faces of the cotyledons plane.

59. **Eugenia Hemsleyana** King, Mat. F.M.P., No. 12, 88 (1901); Ridl., F.M.P., I, 732, *?Syzygium urceolatum* (Korth.) Merr. & Perry in Mem. Amer. Acad. Arts & Sci. XVIII, 3, 174 (1939). (Fig. 27*a*).

PERAK: Gopeng, 500–800 feet, *Kunstler 6114* (syntype), near Ulu Kerling, 400–600 feet, *Kunstler 8697* (syntype); Relau Tujor, *Wray 1803* (syntype); Temengoh, *Ridley 14691.*

PAHANG: Kuala Teku, *Seimund 446;* Teku, *SFN 8088* (*Haniff & Nur*); Sungai Teku, 500 feet, *SFN 31711* (*Kiah*); Sungai Tahan, *Ridley 2634, SFN 20086* (*Holttum*); track to Gunong Tahan, *Corner s.n.;* Ulu Sekin, Rompin, *Forest Dept. FMS 3202.*

Distrib: ? Borneo, ? Sumatra.

A *tree*, bark pinkish grey, slightly flaky, more or less entire; inner bark red brown, astringent. *Twigs* terete, more or less compressed below nodes, bark smooth, yellowish grey to pale brown. *Leaves* large, stiffly coriaceous, elliptic to oblong elliptic, apex shortly acuminate, base cuneate, from c. 13 cm. × 6·5 cm. to 32 cm. × 14 cm., upper surface drying almost black, somewhat polished, smooth, lower surface dull dark reddish brown; midrib narrowly impressed above, prominent and rounded below; *primary nerves* up to c. 25 pairs, 1–2 cm. apart, impressed above, prominent below, arising almost horizontally from midrib and curving upwards, the upper ones usually strongly curved upwards, meeting a prominent looped intramarginal nerve c. 4–7 mm. from leaf margin, with another faint series of loops close to the recurved margin; secondaries and reticulations very faint or invisible above; the secondaries below prominent, but less so than primaries, the lax reticulations fine and rather faint; petiole stout, c. 1–1·5 cm. long, channelled above.

Panicles terminal and axillary, sometimes clustered, usually peduncled, reaching c. 12 cm., with 2 or 3 distant pairs of spreading or ascending branchlets, the lower ones up to c. 4 cm. long, the upper short, rachis and branchlets compressed, with dark striate bark; *flowers* crowded at branchlet ends in heads, sessile; *calyx* after anthesis widely campanulate, c. 6 mm. long, tapered to base and constricted into a distinct very short pseudostalk c. 1 mm. long; lobes 4, unequal, deciduous, the two outer very thick, very broad and rounded, c. 3 mm. across and 1·5 mm. tall, the inner two somewhat thinner, c. 5 mm. across and 3 mm. tall; *petals* free, suborbicular, rather thick textured, 4–5 mm. diam.; *stamens* numerous, filaments slender, flattened at base, up to 6–7 mm. long, anthers oblong or elliptic, c. 0·6 mm. long, connective gland rather conspicuous; *style* stout, c. 8 mm. long; *ovary* 2-celled, multiovulate.

Fruit (unripe) globular, vertically ridged or nearly smooth, apical calyx rim prominent, but without calyx lobes; pericarp probably leathery and rather thin; seed 1.

The material of *E. Hemsleyana* is not particularly good, and good flowering material and ripe fruit have yet to be collected. It differs from *E. Dyeriana* in the larger and broader more elliptic leaves with different venation—in *E. Dyeriana* the primary nerves below are black, rather broad, ascending and nearly straight, in *E. Hemsleyana* they are prominent but not broad, almost horizontal at first then curving boldly upwards, the reticulations usually more evident. The flowers of *E. Hemsleyana* are smaller and the calyx more narrowed at base into a more evident pseudostalk.

Merrill and Perry, loc. cit., state that *SFN 8088* appears to be a good match for Bornean material of *Syzygium urceolatum* (Korth.) Merr. and Perry. They state also that *S. urceolatum* closely resembles *E. Hemsleyana*. It is possible that the two are conspecific, but I have not seen material of *S. urceolatum*. If they are, King's name will stand, as Korthals' is preoccupied in *Eugenia* and there is apparently no other available.

60. **Eugenia pergamentacea** King, Mat. F.M.P., No. 12, 87 (1901); Ridl., F.M.P., I, 732. (Fig. 27*b*).

KEDAH: Gunong Lang near Baling, *SFN 35056* (*Kiah*), *Kiah s.n.;* Bongsu Forest Reserve, *Forest Dept. FMS 33041.*
PENANG: Government Hill, *Curtis 1440* (lectotype collection); Muka Head, *Curtis 1440, Ridley 10781;* Waterfall, *Curtis 1440;* Pulau Betong, *Curtis 1440;* West Hill, *Curtis s.n.;* Hindu Temple, *Haniff 1084;* sine loc., *Cantley 2689, 2692.*
PERAK: Ulu Temengoh, *Ridley 14628.*
SELANGOR: Weld Hill Forest Reserve, *Forest Dept. FMS 579.*
Distrib: Endemic.

Curtis 1440 is the type number, but this was cited by King with no other indication of locality than Penang.

Curtis frequently gave the same number to specimens from different localities which he thought belonged to the same species. In this case I have selected the Government Hill collection as the lectotype.

A small *tree*. *Twigs* terete, rather stout, bark pale brown, smooth or somewhat flaky, the very youngest shoots

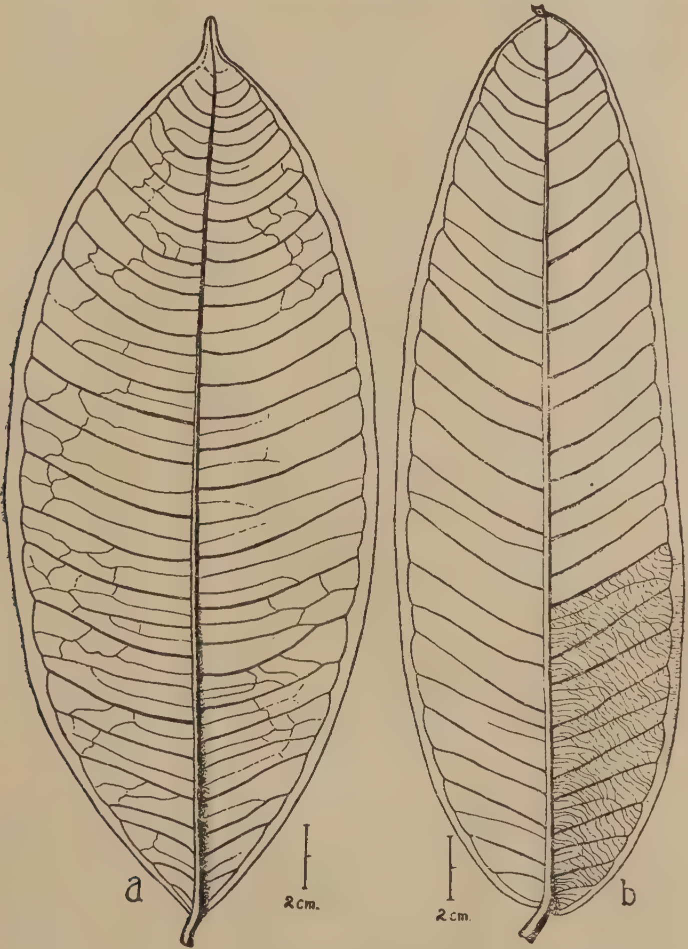

Fig. 27. a, *E. Hemsleyana;* b, *E. pergamentacea.*

with blackish brown smooth bark. *Leaves* chartaceous-coriaceous, large, narrowly elliptic oblong to oblong, up to c. 46 cm. long and 15 cm. broad, apex shortly and abruptly acuminate, base cuneate or narrowed and rounded, occasionally subcordate; upper surface drying leaden brown to blackish brown, somewhat polished, lower surface brown to dark reddish brown, dull; midrib impressed above, very prominent and rounded below; *primary nerves* c. 24–42 pairs, depressed and distinct above, very prominent below, very regular, c. 1 cm. apart, slightly ascending, running straight or curving slightly up to a prominent, nearly straight or shallowly looped intramarginal nerve 4–6 mm. from leaf margin with a much fainter loop close to margin; secondaries few, almost as prominent as primaries, reticulations transverse, close and parallel, raised and fine on both surfaces and distinct; petiole stout, up to 2 cm. long, channelled above.

Panicles terminal or axillary, solitary or two or three together, up to c. 15 cm. long, usually peduncled, branchlets up to c. 4 pairs, distant, spreading or ascending, the lower ones as much as 6 cm. long but usually shorter, the upper ones shorter, they and rachis rather stout or slender, more or less compressed, with dark bark; *flowers* in twos or threes at branchlet ends, buds pale green, depressed globular, c. 8–9 mm. long and 1 cm. across; *calyx* after anthesis shortly and widely campanulate, suddenly contracted into a rather stout pseudostalk c. 3 mm. long; lobes 4, subpersistent, unequal, glandular, inflexed and overlapping in bud, the outer two thick, broadly oblong, c. 4 mm. across and 4 mm. tall, the inner c. 6 mm. across and 4–5 mm. tall, with thin margins; *petals* 4, ovate orbicular, with large gland dots, c. 5 mm. diam.; *stamens* very numerous, up to 6–7 mm. long, anthers oblong, c. 0·6 mm. long, connective gland large and conspicuous; *style* stouter than filaments, c. 4 mm. long; *ovary* 2-celled.

Fruit more or less globose, c. 2·5 cm. diam., faintly vertically ridged, calyx rim rather conspicuous, 2–3 mm. high; pericarp about 2 mm. thick; seed apparently naked, cotyledons nearly equal, inner faces plane or concave, point of attachment nearly central.

A striking species with its large oblong leaves with close parallel reticulation below, unfortunately still rather poorly represented by existing collections. It is allied to *E. Hemsleyana* but the leaves are narrower and more oblong, the primary nerves below more prominent, straighter and ascending, the reticulation closer and more evident, the flowers are much larger and the fruit is probably also larger.

61. **Eugenia Gageana** King, Mat. F.M.P., No. 12, 116 (1901); Ridl., F.M.P., I, 729. (Fig. 28*a*).

PERAK: Larut, *Kunstler 7563* (type collection).
Distrib: Endemic.

A *tree* up to c. 15 metres tall. *Twigs* rather stout, terete, compressed at nodes, with smooth brown bark. *Leaves* thickly coriaceous, oblong lanceolate, apex acuminate, base cuneate, c. 15 cm. × 5·5 cm., both surfaces drying dull brown, the upper smooth, punctate, the lower wrinkled, without visible glands; midrib narrowly impressed above, prominent below; *primary nerves* up to c. 20 pairs, almost invisible above, elevate, slender and distinct below, c. 0·5 cm. apart, curving up to a distinct looped intramarginal nerve 2–3 mm. from leaf margin, secondaries and reticulations invisible above, well marked and almost as prominent as primaries below; petiole stout, less than 5 mm. long, channelled above.

Panicles terminal, sessile, with several spreading-ascending branches 4–5 cm. long from the base, rather stout, obtusely 4-angled, bark dark; *flowers* "waxy white tinged with red", sessile, rather crowded, in threes at ends of short branchlets; buds obovoid, 7–8 mm. long; *calyx* in bud 7–8 mm. long, narrowly obovoid, narrowed rather abruptly into a pseudostalk c. 2 mm. long; lobes 4, subequal, shallow and broad, acute or subacute, c. 2 mm. across and 1 mm. tall; *petals* calyptrate, but the outer one free, rather thick textured, orbicular, c. 3 mm. diam.; *stamens* numerous, anthers small with a rather conspicuous connective gland; *ovary* 2-celled. *Fruit* unknown.

Very little material of this species is available, and that only in bud. It is not at all like *E. densiflora* as Ridley suggests.

62. **Eugenia Prainiana** King, Mat. F.M.P., No. 12, 116 (1901); Ridl., F.M.P., I, 750. (Fig. 28*b*).

PERAK: Blanda Mabok, *Wray 3990* (syntype); Larut, within 100 feet, *Kunstler 5309, 6584* (syntypes).
Distrib: Endemic.

A large *tree* reaching 48 metres tall and 60–90 cm. diam. (fide Kunstler). *Twigs* rather stout, terete, bark smooth, brown. *Leaves* coriaceous, elliptic oblong, apex acuminate, base cuneate, up to c. 12·5 cm. × 5 cm., upper surface drying dark brown to nearly black, polished, lower surface paler, dull; midrib impressed above, elevate and keeled below; *primary nerves* about 25 pairs, very slender and slightly raised on both surfaces, indistinct, ascending slightly to a nearly straight and very fine intramarginal nerve c. 1–2 mm. from leaf margin, secondaries and reticulations slightly raised on both surfaces, hardly distinguishable from primaries; petiole slender, up to about 1·5 cm. long.

Panicles terminal or occasionally from upper leaf axils, up to c. 6 cm. long, the axillary ones shorter, condensed, corymbose, on short stout peduncles, or almost sessile, branchlets short, stout, crowded, 4-angled or compressed, with dark bark; *flowers* white, sessile, in threes at branchlet ends, buds clavate, c. 9–10 mm. long; *calyx* in bud funnel shaped, 8–9 mm. long, tapering gradually to base, pseudostalk c. 4 mm. long but not well defined; lobes 5, nearly equal, persistent, broadly ovate triangular rounded, fleshy with thin cartilaginous tips, c. 2 mm. across and 1·5 mm. tall; *petals* falling as a calyptra, but the outer one free, orbicular, thin, c. 4 mm. diam., with sparse but conspicuous gland dots, the others agglutinated into a thick calyptra; *stamens* numerous, filaments subulate, anthers broadly elliptic, connective gland small but distinct; *ovary* 2-celled.

Fruit (probably unripe) oblong ovoid to globular, c. 2·5 cm. long and 2 cm. diam., apex with conspicuous long calyx tube 5–6 mm. long and 5 mm. diam., fringed with the remains of the calyx lobes; pericarp rather thin and leathery; seed 1, cotyledons very unequal, one about ¼ the size of the other, inner faces more or less concave, attached to hypocotyle by short stalks.

63. **Eugenia Pearsoniana** King, Mat. F.M.P., No. 12, 116 (1901). *E. Prainiana* King var. *Pearsoniana* (King) Ridl., F.M.P., I, 751 (1922). (Fig. 28*c*).

PERAK: Larut, 800–1,000 feet, *Kunstler 3526* (type collection).
JOHORE: Gunong Panti, 1,500 feet in ridge forest, *SFN 32219* (*Corner*).
Distrib: Endemic.

A *tree* 15–30 metres tall; bark pinkish fawn, more or less entire; inner bark pale brownish drab; wood dingy brownish-yellowish. *Twigs* terete, slender, bark smooth or slightly flaky, whitish or pale brown. *Leaves* coriaceous, ovate or elliptic or oblong elliptic, apex caudate acuminate, base cuneate, or rounded and abruptly narrowed on to petiole, up to c. 10 cm. × 5 cm.; upper surface shining, drying olivaceous brown, minutely punctate or pustulate, lower surface dull, reddish brown, minutely pustulate; midrib impressed above, elevate below and rather sharply keeled; *primary nerves* up to c. 30 pairs, close together, slightly ascending and curving up to a very faint intramarginal nerve very close to leaf margin, slightly raised above and faint, slightly raised below and very fine and

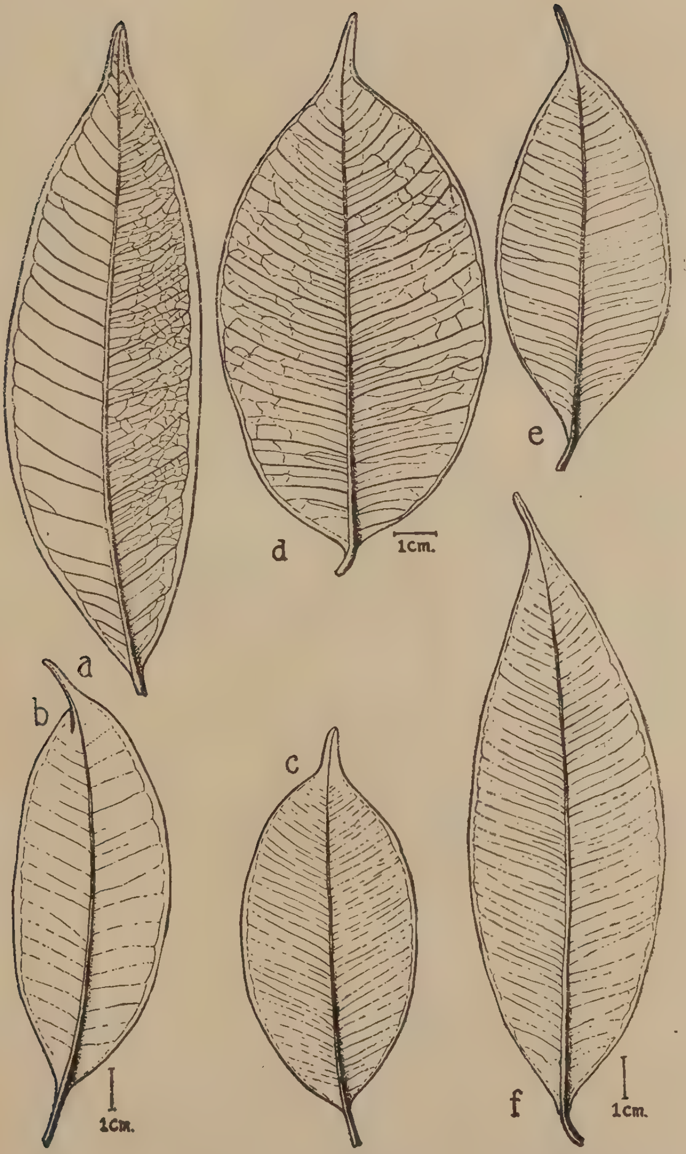
a
b
c
d
e
f
1cm.
1cm.
1cm.

Fig. 28. a, *E. Gageana;* b, *E. Prainiana;* c, *E. Pearsoniana;* d, *E. oblata;* e, *E. lævicaulis;* f, *E. inophylla.*

inconspicuous; secondaries very faint, reticulations almost or quite invisible; petiole slender, 6–10 mm. long.

Panicles terminal, short, condensed, 2–4 cm. long, sessile or on very short stout peduncles, branchlets crowded, short, thick, angled and compressed; *flowers* cream white, the top of calyx tube often pinkish, sessile in twos or threes at branchlet ends, buds clavate, c. 8 mm. long; *calyx* after anthesis funnel shaped, c. 6 mm. long, tapering to a short stout not well defined pseudostalk c. 2 mm. long; mouth with 4 very shallow oblong lobes, appearing truncate; *petals* calyptrate, but the outer one free, rather thick textured, orbicular, c. 4 mm. diam., the others agglutinated; *stamens* numerous, up to c. 11 mm. long, filaments slender, subulate, somewhat flattened below, anthers broadly oblong or oblong elliptic, c. 0.6 mm. long, connective gland small; *style* slender, only a little stouter than filaments, flattened and ridged, c. 7 mm. long; *ovary* 2-celled, multiovulate. *Fruit* unknown.

Ridley reduces this species to a variety of *E. Prainiana*, but although little material of either species is known, I believe them to be distinct, although closely allied. *E. Pearsoniana* differs from *E. Prainiana* in the thinner and paler twigs, the leaves more abruptly acuminate; the stouter and more condensed inflorescence; the calyx mouth obscurely and shallowly lobed, not with definite lobes with thin tips. Fruit of *E. Pearsoniana* when found may add other distinguishing characters.

64. **Eugenia oblata** Roxb., Fl. Ind., II, 493 (1832); Hort. Beng. 37 (1814), nom. nud.; Duthie in Hook. fil., F.B.I., II, 492; King, Mat. F.M.P., No. 12, 114; Gagnep. in Fl. Gen. Indo-Ch., II, 805; Ridl., F.M.P., I, 749, excl. syn.; Craib, Fl. Siam. Enum., I, 652. *Syzygium oblatum* Wall. Cat. 3569; Cowan & Cowan, Trees North Bengal, 68 (1929); Merr. & Perry in Journ. Arn. Arb. XIX, 101; Mem. Amer. Acad. Arts & Sci., XVIII, 3, 187. *Eugenia limnoea* Ridl. in Journ. Roy. As. Soc. Str. Br., LXXIX, 64 (1918), excl. specimina Scortechiniana; F.M.P., I, 729, excl. syn. *E. laxiuscula* Ridl. in Journ. F.M.S. Mus., X, 133 (1920); F.M.P., I, 750. ?*E. limnoea* Ridl. var. *gracilior* Craib, Fl. Siam Enum., I, 650 (1935). (Fig. 28*d*).

Widely distributed but not very frequent from Setul and Kelantan to Johore, mostly on tidal rivers and near the sea. *Distrib:* Burma, Siam, Indo-China, Borneo.

A riverside *bush* or a *tree* up to c. 15 metres tall; bark smooth or becoming slightly scaly flaky, light greyish green or brown or pale greyish buff. *Twigs* rather slender, terete, more or less compressed below nodes, bark drying brown, smooth or flaky. *Leaves* coriaceous, broadly lanceolate to oblong elliptic, apex acuminate, base cuneate or rounded and rather abruptly narrowed to petiole, from c. 7·5 cm. × 3 cm. to 16·5 cm. × 6·5 cm.; upper surface drying olivaceous brown to blackish brown, closely and minutely punctate or sometimes pustulate, lower surface brown or reddish brown, glandular pustulate or black gland dotted; midrib impressed above, elevate below; *primary nerves* up to c. 25 pairs, usually c. 5 mm. or less apart, raised and slender on both surfaces, usually rather indistinct above and distinct below, slightly ascending and curving up to a shallowly looped or nearly straight intramarginal nerve close to leaf margin; secondaries and reticulations below numerous and close, almost as distinct as primaries; petiole up to c. 1 cm. long.

Panicles terminal and axillary, sometimes clustered, sessile or more usually pedunculate, shorter than leaves, more or less corymbose, reaching c. 7 cm. long, the primary branchlets few, slender, angled, ascending, the secondary branchlets short and rather crowded; *flowers* white or pale cream, calyx tube often slightly pinkish, sessile in threes or clustered at branchlet ends, buds clavate, reaching c. 1 cm. long; *calyx* funnel shaped, 6–8 mm. long, tapered to a rather slender pseudostalk 2–3·5 mm. long; lobes 5 (?or 4), subpersistent, subequal, short broad and rounded, c. 2·5 mm. wide and 1 mm. tall; *petals* calyptrate, calyptra thin, all the petals agglutinated or the outer one or two free, thin, gland dotted, orbicular, c. 5 mm. diam.; *stamens* numerous, filaments slender, subulate, up to c. 1·7 cm. long, anthers oblong elliptic 0·8–1 mm. long, connective gland small; *style* subulate, stouter than filaments, and about as long as them; *ovary* 2-celled.

Fruit more or less wholly suffused dull purple, depressed globose or oblong globose, slightly compressed laterally, c. 1·75 cm. long and 2 cm. broad, faintly vertically ridged, apical umbilicus rather deep, c. 4 mm., diam., calyx rim rather prominent, 1–1·5 mm. tall, bearing the somewhat enlarged but not conspicuous upright or incurved calyx lobes; pericarp c. 2 mm. thick; testa very thick, c. 0·5 mm., hard, crustaceous, adhering closely to the pale smooth surface of cotyledons; cotyledons nearly equal, opposing faces nearly plane, one cotyledon almost sessile on the hypocotyle, the other with a short broad stalk.

Syntypes of *E. laxiuscula* Ridl. and *E. limnoea* Ridl. are in Herb. Singapore. I can detect no significant points of difference between them and typical *E. oblata* Roxb. *E. oblata*, in common with most widely distributed species, shows considerable variation in size and shape of leaf and of inflorescence and there is some variation in size of flower.

Ridley includes under his *E. limnoea*, *E. oblongifolia* Duthie var. *robusta* King. This variety certainly has nothing to do with *E. oblongifolia* but neither can it be placed with *E. limnoea*. It differs in the truncate calyx mouth, the paler smoother twigs, different leaf texture and venation. I believe it to be *E. inophylla* Roxb.

In his remarks on *E. limnoea* in Journ. Roy. As. Soc. Str. Br., LXXIX, p. 64, Ridley says that King identified this as *E. densiflora* Duthie and that *E. limnoea* is allied to this species. I have seen no specimens of *E. limnoea* previously written up by King (except *Scortechini 216*, which is *E. oblongifolia* var. *robusta*), nor does King quote any of the numbers cited by Ridley. There is not, to my eye, even a superficial resemblance to *E. densiflora*.

In the original description of *E. laxiuscula* and also in Fl. Mal. Pen., Ridley cites *Curtis 975* as the type of his species. This is an error for *Curtis 973* (identified by King as *E. inophylla*). *Curtis 975* is *E. Bernardi* King.

65. **Eugenia laevicaulis** Duthie in Hook. fil., F.B.I., II, 492 (1878); King, Mat. F.M.P., No. 12, 116; Ridl., F.M.P., I, 749, sub *E. oblata* Roxb. (Fig. 28*e*).

KEDAH: Jerai Forest Reserve, *Forest Dept. FMS 17917*.

PENANG: sine loc., *Wallich 3600D, Curtis 2246, 2247;* Moniot's road, 1,200 feet, *Curtis 666;* Coolie Lines, Government Hill, 1,200 feet, *Curtis 666;* Government Hill, 2,300 feet, *Curtis 750;* Muka Head, 800 feet, *Curtis 750;* top of Penang Hill, *Ridley s.n.;* Penang Hill, 2,300 feet, *SFN 21438* (*Henderson*), *SFN 21468, 21496* (*Ewart*).

MALACCA: sine loc., *Maingay K.D. 753* (type collection).

JOHORE: Panti river, Kota Tinggi, *Ridley 15448* (this specimen differs from the typical form in having considerably larger and broader leaves, up to 15 cm. long and 7 cm. broad, and the inflorescences longer and less condensed with more slender branches).

Distrib: Endemic.

A massive but not tall *tree;* bark fissured. *Twigs* slender, terete, pale yellowish or pale brown, bark smooth and more or less polished, sometimes flaky. *Leaves* coriaceous, oblong lanceolate or oblong elliptic, sometimes ovate oblong, rather abruptly acuminate or caudate acuminate with a very narrow acumen, base cuneate, 6·5–10 cm. long, 2·5–4·5 cm. broad, upper surface drying olivaceous brown to almost black, more or less polished, minutely punctate or glandular pustulate, lower surface reddish brown to chocolate brown, obscurely pustulate; midrib shallowly depressed above, elevate below, more or less keeled; *primary nerves* about 25 pairs, close together (2–3 mm. apart), slightly raised on both surfaces and very faint, especially above, meeting in an almost straight intramarginal nerve c. 1 mm. from leaf margin; secondaries and reticulations very faint; petiole up to c. 1 cm. long.

Panicles terminal or occasionally from upper axils, short and condensed, up to c. 3 cm. long, rachis stout, branchlets short and crowded, stout, 4-angled with dark wrinkled bark; *flowers* with pale green calyx and greenish white petals, usually in threes at branchlet ends, all sessile or occasionally the centre one on a very short stout pedicel; buds clavate or cylindric clavate 8–9 mm. long; *calyx* after anthesis funnel shaped or slightly campanulate, tapering evenly to base, without a well defined pseudostalk; lobes 5, triangular, subacute or blunt, c. 2 mm. across and 1·5 mm. tall, spreading or reflexed after flowering, persistent; *petals* agglutinated into a thick orbicular calyptra c. 5 mm. diam; *stamens* numerous, filaments slender, subulate, up to 9–10 mm. long, anthers oblong elliptic, 0·6–0·7 mm. long, connective gland small; *style* stouter than filaments, c. 5 mm. long; *ovary* 2-celled.

Fruit globose or transversely oblong globose, brown when dry, pustulate, faintly vertically ridged, c. 1·5 cm. diam., apical calyx tube prominent, c. 2 mm. tall and 5 mm. across, fringed by the spreading hardly enlarged calyx lobes; pericarp rather thin, testa rather thick, pithy crustaceous; seed 1, cotyledons nearly equal, side by side, outer surfaces finely gland pitted, inner faces somewhat concave, gland dotted, sessile on the hypocotyle or nearly so, plumule large.

Distinct from *E. oblata* Roxb., to which it is reduced by Ridley, in the pale bark of the twigs, the smaller leaves with fainter venation, shorter, much contracted inflorescences with stouter branchlets, calyx less narrowed at base, with smaller subacute triangular lobes, and shorter stamens.

66. **Eugenia Haniffii** Henderson in Gardens' Bulletin, Singapore, XI, 309, fig. 6 (1947).

PENANG: Penara Bukit, c. 1,000 feet, *Curtis 794.*
SELANGOR: 20th mile, Ginting Simpah, *Forest Dept. FMS 12860;* 23rd mile. Ginting Simpah, *Forest Dept FMS 13383.*
Distrib: Endemic.

A *tree* 12–15 m. tall. *Twigs* rather stout, terete, bark reddish brown nearly smooth. *Leaves* chartaceous, drying greenish brown to dull grey brown above, dull grey brown below, oblong to elliptic oblong, base cuneate, apex rather abruptly acuminate, up to c. 13 cm. × 5 cm., petiole slender, c. 5–7 mm. long; midrib sunk above, prominent below; *primary nerves* fine, not more prominent than secondaries and hardly distinguishable from them, about 25-40 pairs, raised above and below, meeting in an inconspicuous intramarginal nerve c. 2–4 mm. from leaf margin.

Panicles terminal, densely flowered, often much contracted, usually less than 8 cm. long, primary branches stout with reddish brown bark, ultimate branchlets finer, more or less 4-angled, with dark striate bark; *flowers* in threes at ends of branchlets, the centre one sessile, the outer ones on pedicels c. 0·8 mm. long; *calyx* narrowly funnel-shaped in bud, c. 4–6 mm. long including lobes, gradually narrowed to a slender pseudostalk; lobes 4, conspicuous, broad, persistent after anthesis, c. 1·5 mm. tall and 2·5 mm. wide, rather thick textured with membranous margins; *petals* 4, free, membranous, persistent for some time after anthesis; *stamens* 9–12 mm. long, *style* about as long; *ovary* 2-locular with many ovules.

Fruit globose or slightly depressed globose, c. 1·5 cm. diam. (?unripe), crowned by calyx limb and persistent sepals; seed 1, globose, cotyledons more or less equal, attached to hypocotyle near centre of opposing faces.

This species is distinguished from *E. oblata,* to which it appears nearest, by the smaller flowers, more deeply lobed calyx, denser inflorescence, and the thinner leaves with finer and closer venation, with the intramarginal nerve further from margin.

67. **Eugenia camptophylla** Henderson in Gardens' Bulletin, Singapore, XI, 311, fig. 7 (1947).

PERAK: Gopeng, 500–800 feet, open jungle in hilly locality, *Kunstler 5594.*
Known only from the above collection.

A *tree* 12–15 m. tall, stem 20–23 cm. diam., *twigs* smooth, terete, bark dull brown; *leaves* lanceolate or narrowly elliptic lanceolate, or somewhat ovate-lanceolate, up to c. 13 cm. × 4 cm., apex long acuminate, often folded or bent sideways when dry, base long narrowed and somewhat decurrent on petiole; upper surface drying blackish brown, lower surface dull reddish brown; midrib sunk above, raised below; *primary nerves* about 20 pairs, very faint above, slightly raised below, very slender and inconspicuous, meeting in a very fine intramarginal nerve 1–2 mm. from the recurved leaf margin; secondaries and reticulations a little less conspicuous than primaries below; petiole up to c. 1 cm. long, slender.

Inflorescence a spreading panicle, or several together, terminal or from upper one or two axils, on a peduncle up to c. 4 cm. long but usually not exceeding c. 1 cm., peduncle and inflorescence branches rather slender, strongly angled, with striate bark, the whole inflorescence up to c. 9·5 cm. long and 6 cm. across; *flowers* densely crowded at ends of branchlets, c. 1 cm. long, sessile; *calyx* in bud funnel shaped, c. 6 mm. long and 3 mm. across mouth, tapering gradually from apex to base, the pseudostalk c. 2–3 mm. long but not sharply marked off, calyx mouth with five broad shallow inconspicuous blunt or subacute subpersistent lobes c. 1·25 mm. wide and 0·5 mm. tall, but variable in size; *petals* probably falling as a calyptra but easily separable, more or less orbicular, c. 3 mm. diam.; *stamens* numerous, filaments slender, up to c. 8 mm. long, anthers triangular ovate, c. 0·5 mm. long, connective gland inconspicuous; *style* considerably stouter than filaments, c. 6 mm· long. *Fruit* unknown.

A species probably allied to *E. inophylla* and to *E. oblata* but differing from the former in the larger calyx lobes, and the narrower leaves with fewer veins, and from the latter by the smaller and narrower flowers and the much narrower leaves with less prominent venation.

68. **Eugenia inophylla** (DC.) Roxb., Fl. Ind., II, 496 (1832); Duthie in Hook. fil., F.B.I., II, 480; King, Mat. F.M.P., No. 12, 114; Ridl., F.M.P., I, 750. *?E. oblongifolia* Duthie var. *robusta* King, loc. cit., 112. *Syzygium inophyllum* DC., Prodr., III, 260 (1828); Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 188. (Fig. 28*f*).

In lowland forest from Penang and Kelantan to Singapore, commonest in the north of the Peninsula.
Distrib: Burma, Borneo, Moluccas (fide Merrill & Perry).

A *tree* reaching c. 24 metres tall. *Twigs* rather slender, terete or obscurely quadrangular, bark brown, smooth. *Leaves* coriaceous, narrowly elliptic or elliptic oblong or elliptic lanceolate, apex acuminate, usually rather abruptly so, base cuneate, up to c. 14 cm. × 5 cm.; upper surface drying nearly black, obscurely punctate or pustulate, somewhat polished, lower surface dark brown or reddish brown; midrib impressed above, elevate below; *primary nerves* very numerous and close together, slightly elevate on both surfaces and faint, ascending and curving up to a faint intramarginal nerve c. 1 mm. from leaf margin; reticulations close and elongate, raised and faint on both surfaces; petiole up to c. 1 cm. long.

Panicles terminal or from upper axils, rather dense, corymbose, peduncled, up to c. 12 cm. long with numerous rather slender angled and compressed branchlets; *flowers* cream or white, crowded at branchlet ends, sessile; buds clavate, c. 7–8 mm. long; *calyx* funnel shaped after anthesis, c. 6 mm. long, tapering gradually to a slender pseudostalk

2–3 mm. long, mouth with five very shallow broad obscure lobes less than 1 mm. tall; *petals* calyptrate, the calyptra thin and usually the outer petal partially free; *stamens* numerous, filaments slender, subulate, up to c. 7–8 mm. long, anthers ovate triangular, 0·6–0·8 mm. long, connective gland small and acute but distinct; *style* rather slender but stouter than filaments, subulate, c. 7 mm. long; *ovary* 2-celled.

According to Roxburgh the *fruit* is large and pear-shaped. No ripe fruit on Malayan material has been seen.

This species differs from *E. oblata* Roxb. in the generally smaller flowers, with the calyx mouth almost truncate or very obscurely lobed or wavy, not with shallow broad persistent lobes; in the smoother darker twigs, not reddish and more or less flaky; in the nerves being less prominent above, rather closer, much less prominent below, reticulations on the upper surface more evident and finer, less evident below. Ridley says that the nervation of *E. inophylla* is as in *E. oblata*, but there is a distinct difference.

I include here with some doubt *Scortechini 216* which is the type of King's variety *robusta* of *E. oblongifolia* Duthie. Ridley places it under *E. oblata* Roxb., but it does not belong there (see note under that species). The two sheets of this number in Herb. Singapore have much paler twigs than other specimens of *E. inophylla*, the leaves have longer petioles and are pustulate on both surfaces. The inflorescence and flowers are those of typical *E. inophylla*.

69. **Eugenia Bernardi** King, Mat. F.M.P., No. 12, 115 (1901). *E. inophylla* Roxb., var. *Bernardi* (King) Ridl., F.M.P., I, 750 (1922). *E. simulans* King, loc. cit., 129, pro parte. (Fig. 29*a*).

PENANG: Government Hill, 2,000 feet, *Curtis 2845* (syntype); sine loc., *Curtis 975* (syntype).

PERAK: sine loc., *Scortechini 326* (syntype).

SELANGOR: 15th mile, Pahang track, *Ridley 8617* (syntype); Weld Hill Forest Reserve, *Forest Dept. FMS 1223, 17465*.

PAHANG: Cameron Highlands, *Forest Dept. FMS 20806*; Sungai Terolak, Ulu Telom, *Forest Dept. FMS 27553*; Kuala Sungai Kial, Telom, *SFN 23908* (*Kiah*); Rotan Tunggal Forest Reserve, *Forest Dept. FMS 29353*; Sungai Tahan, *SFN 20074* (*Holttum*).

Distrib: ? Borneo (*see* Merrill & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 197).

A medium sized to tall *tree*. *Twigs* slender, terete, or the youngest ones slightly compressed, dark brown, the older ones with pale grey somewhat polished bark. *Leaves* thinly coriaceous, elliptic or elliptic oblong, apex abruptly

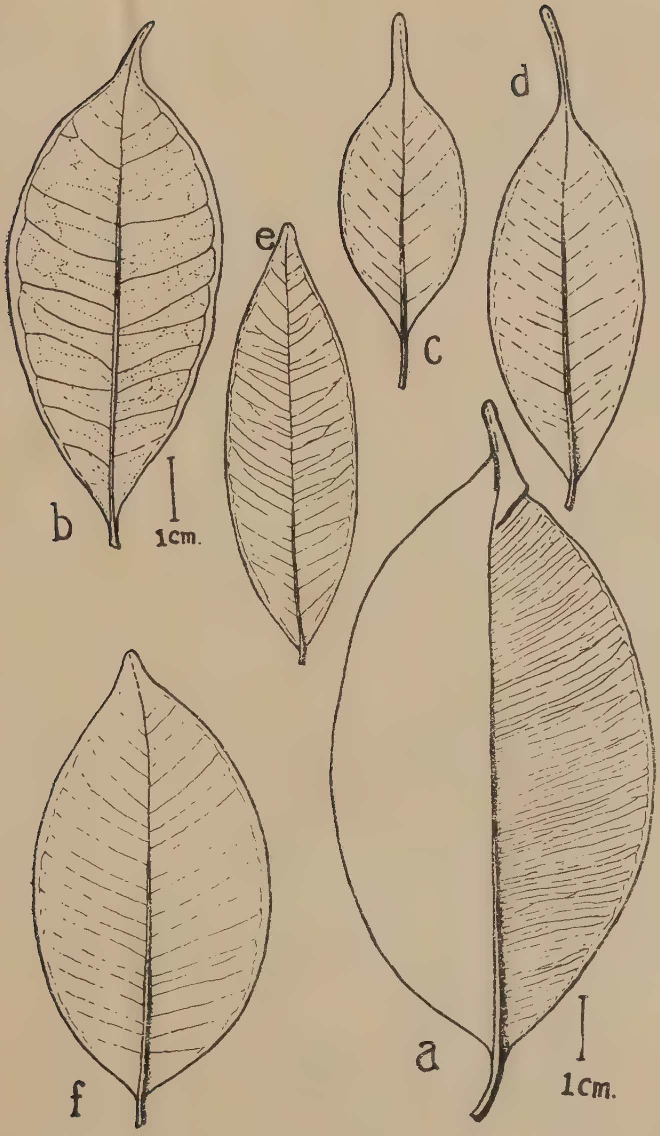
d
e
c
b
1cm.
f
a
1cm.

Fig. 29. a, *E. Bernardi;* b, *E. filiformis;* c, d, *E. caudata;* e, f, *E. oleina.*

and usually shortly acuminate, base cuneate and narrowed on to petiole or more or less rounded and abruptly and shortly narrowed to petiole, from c. 7 cm. × 3·5 cm. to 18 cm. × 8 cm.; upper surface when dry from greenish brown to almost black, more or less shining, closely pustulate or rugulose-pustulate, lower surface paler, greenish to dark brown, pustulate as upper surface; midrib impressed above, prominent below and pustulate; *primary nerves* numerous and close together, raised on both surfaces and very fine, ascending slightly to a fine intramarginal nerve close to the leaf margin; the close rather elongate reticulations raised on both surfaces and almost as distinct as primaries; petiole rather slender, up to c. 1·3 cm. long.

Panicles terminal and axillary, up to c. 10 cm. long, on peduncles of varying length, they and the rachis terete or obscurely quadrangular, with dark striate bark; lowermost branchlets when present ascending, the upper two or three pairs nearly horizontal, 4-angled; bracts and bracteoles subpersistent, small, broadly ovate rounded or ovate triangular subacute; *flowers* sessile in threes or clusters at ends of very short ultimate branchlets; buds obovoid, c. 6 mm. long; *calyx* in bud cylindric campanulate, c. 4·5 mm. long, gradually narrowed to base without a well defined pseudostalk, after anthesis widely campanulate, or funnel shaped, often rather abruptly contracted at base into a definite short pseudostalk c. 1·5 mm. long, mouth almost truncate or with 5 very short broad obscure lobes; *petals* falling in a calyptra but the outer petal free, thin, orbicular, c. 2·5 mm. diam., the others agglutinated; *stamens* numerous, filaments subulate above, more or less flattened at base, up to c. 7 mm. long, anthers oblong ovate c. 0·6 mm. long, connective gland small and inconspicuous; *style* somewhat stouter than filaments, c. 6 mm. long; *ovary* 2-celled.

Fruit (?unripe) globose or depressed globose, c. 2·5 cm. diam., faintly vertically ridged, apical umbilicus c. 3 mm. diam., fringed by the very short calyx rim; pericarp rather thin, testa rather thick, more or less crustaceous, seed 1, c. 1·5 cm. diam., cotyledons slightly unequal, side by side, inner faces nearly plane, gland dotted, attached at their centres to the hypocotyle by very short broad stalks.

Ridley reduces this species to a variety of *E. inophylla* Roxb., but I believe it to be sufficiently distinct in the thinner leaves, with the upper surface finely wrinkled or pustulate, the longer and more slender petioles, the shorter and more cupshaped flowers with either a very short stout pseudostalk or none.

70. **Eugenia Brantiana** Henderson in Gardens' Bulletin, Singapore, XI, 313, fig. 8 (1947).

JOHORE: Sungai Pontian Besar, common on the riverbank in the *Terminalia-Pandanus* zone, *SFN 36754* (*Henderson*), *SFN 36956* (*Corner & Henderson*).
Known so far only from this locality.

A *shrub* or small bushy *tree*. *Branchlets* terete, bark smooth, grey brown to reddish. *Leaves* thinly coriaceous, oblong elliptic to ovate, up to c. 13 cm. long and 5 cm. broad, apex long acuminate, acumen 1–2 cm. long, base cuneate and narrowed on to petiole, upper surface drying greenish to reddish brown, minutely gland dotted, lower surface greenish to brownish, paler than upper, minutely gland dotted; midrib shallowly impressed above, elevate below; *primary nerves* up to c. 15 pairs, slender and not conspicuous above, pale and very slightly raised, slightly raised and slender below; secondaries and reticulations usually obscure above, visible below and almost as conspicuous as primaries; intramarginal nerve slender and inconspicuous, 1–2 mm. from leaf margin; petiole c. 0·5 cm. long.

Inflorescences terminal or from upper axils, paniculate, up to c. 9 cm. long, nearly sessile or on peduncles up to c. 3 cm. long, primary branchlets up to c. 2 cm. long; *flowers* sessile, clustered either at the ends of the primary branchlets or of shorter secondary branchlets; buds c. 1 cm. long; *calyx* c. 7–8 mm. c. 5 mm. across mouth, narrowed at base into a rather stout pseudostalk 2–3 mm. long, lobes broad, shallow, inconspicuous, c. 0·75 mm. tall and 2–2·5 mm. wide, pellucidly gland dotted; *petals* calyptrate, pellucidly gland dotted; *stamens* very numerous, 15–16 mm. long, anthers ovate oblong, 0·5–0·75 mm. long, connective gland conspicuous; style 12–13 mm. long; *ovary* 2-celled with several ovules in each cell. *Fruit* unknown.

Another species allied to *E. inophylla,* but differing in the paler bark of the twigs, the much longer stamens, and in being a bush or small bushy tree of tidal rivers.

71. **Eugenia filiformis** Duthie in Hook. fil., F.B.I., II, 478 (1878); King, Mat. F.M.P., No. 12, 105, pro parte; Ridl., F.M.P., I, 740; Corner, Wayside Trees of Malaya, p. 497, fig. 168. *E. clavimyrtus* var. *minor* Koorders & Valeton in Meded. Lands Plantent., XL, 112 (1900). *Syzygium filiforme* Wall. Cat. 3580. (Fig. 29*b*).

Common in lowland forest from Perak to Singapore.
Distrib: Java.

A small or medium sized *tree* with dense crown and drooping branches, without buttresses; bark smooth or very finely creviced in places, warm red brown; inner layers thin, paler brown, wood very pale buff, darkening on exposure. *Twigs* very slender, terete, bark smooth, greyish or brownish. *Leaves* coriaceous, variable in size and shape from lanceolate or ovate lanceolate to oblong elliptic, apex acuminate or caudate acuminate, base cuneate, or rounded and abruptly narrowed to and often decurrent upon petiole, from c. 5 cm. × 1·75 cm. to 11 cm. × 5 cm.; both surfaces drying more or less greenish brown, closely and minutely pustulate or black gland dotted, the glands on the lower surface often obscure; midrib impressed above, elevate below, often glandular pustulate; *primary nerves* about 8–16 pairs, c. 0·5 cm. apart, usually slightly raised and very slender and inconspicuous on both surfaces, sometimes almost invisible above, occasionally rather distinct below, curving up slightly to a fine intramarginal nerve c. 2 mm. from leaf margin; secondaries and reticulations usually obscure, especially above, often invisible; petiole slender, up to c. 7 mm. long.

Racemes terminal and axillary, very lax and few flowered, up to c. 10 cm. long, flowers sometimes solitary axillary or extra axillary; peduncles slender, very variable in length, rachis slender, bearing distant pairs of flowers or solitary flowers, usually with two or three clustered at its apex; pedicels filiform, very variable in length, reaching 4·5 cm. long, usually exceeding 1·3 cm.; *flowers* white, *calyx* funnel shaped, 5–6 mm. long, tapered or narrowed rather abruptly into a slender pseudostalk 0·5–8 mm. long, of the same thickness as the pedicel; lobes 4, nearly equal, subpersistent, broad and rounded, thin, gland dotted, c. 2 mm. across and 1·5 mm. tall; *petals* 4, free or calyptrate, or the two outer free and the two inner agglutinated, thin, orbicular, 2·5–3 mm. diam., inconspicuously gland dotted; *stamens* numerous, filaments slender, subulate, up to c. 5 mm. long, anthers oblong elliptic, c. 0·4 mm. long, connective gland small and inconspicuous; *style* much stouter than filaments, c. 10 mm. long; *ovary* 2-celled.

Fruit globose, ovoid globose or more or less depressed globose, sometimes a little angled, up to 1·5 cm. diam., pale whitey green when ripe, apex crowned by the short calyx rim c. 3·5 mm. diam.; pericarp juicy pulpy, up to c. 5 mm. thick, testa adhering loosely to cotyledons, somewhat pithy and rather thick; cotyledons deep reddish purple, inner faces conspicuously gland dotted. Germination hypogeal, the shoot with pink winged angles. (It is rare to find in Singapore fruits that are not infected with the larvae of an insect, apparently the same as that found in *E. pseudosubtilis*).

There is a remarkable and unusual variation in the size of the flower parts in this species, even on the same twig. In *SFN 14924* the calyx tube varies from 4–6 mm. long, the pseudostalk from 2–8 mm. and the pedicel from 18–26 mm. In *Alvins 543,* the calyx tube varies from 3–6 mm., the pseudostalk from 3–7 mm. and the pedicel from 18–29 mm. The range of variation in twelve sheets is—calyx tube 2·5–6·5 mm., pseudostalk 0·5–8 mm., pedicel 13–45 mm.

The very lax racemes with few flowers and the long filiform pedicels are very distinctive.

E. filiformis Duthie var. **clavimyrtus** (Koord. & Valet.) var. nov. *E. clavimyrtus* Koord. & Valet. in Meded. Lands Plantent., XL, 110 (1900); Atlas Baumart. Java, III, fig. 484. *Clavimyrtus glabrata* Bl., Mus., I, 114 (1849). *Myrtus glabrata* Bl., Bijdr., 1083 (1826). *Jambosa glabrata* DC., Prodr., III, 287 (1828), non Eugenia glabrata DC., vel Berg.

Not uncommon in lowland and hill forest from Penang to Singapore.
Distrib: Java.

Leaves much as in *E. filiformis* but sometimes the reticulations raised and distinct on both surfaces. *Flowers* with greenish calyx tube and white petals; *calyx* tube cylindric obconic, slightly ventricose, especially after anthesis, up to c. 20 mm. long, tapered gradually into a slender not sharply defined pseudostalk 1·5–9 mm. long, pedicel filiform 15–60 mm. long; *calyx* limb cyathiform, lobes 4, very unequal, broadly ovate rounded, subpersistent, eventually reflexed, the two outer rather thick, gland dotted, c. 4·5 mm. across and 3 mm. tall, the two inner overlapping in bud, thinner, c. 6–7 mm. across, 5 mm. tall, sparsely but conspicuously gland dotted; *petals* 4, free, or sometimes calyptrate, orbicular, conspicuously pellucidly gland dotted, c. 6–7 mm. diam.; *stamens* numerous, filaments slender, subulate, slightly broadened at base, up to c. 1·2 cm. long (to 2·5 cm. fide Koorders & Valeton), anthers oblong reniform 0·6–0·7 mm. long, connective gland small and inconspicuous; *style* stouter than filaments and as long as them; *ovary* 2-celled, multiovulate.

Fruit oblong globose, c. 1·5 cm. long, crowned by the short calyx rim, umbilicus shallow, c. 5–6 mm. diam., seed 1, cotyledons superposed, sometimes polyembryonic.

This variety differs from the typical form in the longer and narrower calyx tube, gradually tapered into the pseudostalk and in the very unequal calyx lobes. The flowers look so different from those of typical *E. filiformis* that it could perhaps be held to be a distinct species. However, the foliage and inflorescence of both forms are very similar and both have long filiform pedicels.

Koorders and Valeton's *E. clavimyrtus* was based on *Clavimyrtus glabrata* Bl., Blume's name being preoccupied in Eugenia. They reduce E. filiformis to a variety—*minor*—of their species, but the reduction of an older name to a variety of a later is not in accordance with the Rules of Nomenclature. I have examined the type of *Clavimyrtus glabrata* Bl., and although the specimen is fragmentary with old and detached flowers, I believe it to be our plant.

Enumerated below are sterile or fruiting specimens which cannot be assigned definitely either to the typical form or to the variety.

KEDAH: Gunong Jerai Forest Reserve, *Forest Dept. FMS 11274.*
PERAK: Bikum Forest Reserve, *Forest Dept. FMS 5385;* Chikus Forest Reserve, *Forest Dept. FMS 27245, 27246;* Kota, *Wray 3262.*
SELANGOR: Bukit Lagong Forest Reserve, *Forest Dept. FMS 14685;* Kanching Forest Reserve, *Forest Dept. FMS 6365.*
MALACCA: Merlimau, *Derry 471, Alvins s.n.;* Bukit Bruang, *Derry 451, 1230;* sine loc., *Alvins 68.*
PAHANG: Beserah road, *Forest Dept. FMS 3130.*

Craib in Fl. Siam. Enum. I, 641 (1931) describes as new a variety *parvifolia* of *E. filiformis.* The duplicate of the type (*Kerr 7576*) in Herb. Singapore is rather poor, having only a few detached flower buds, but although the shape of the leaves suggests *E. filiformis,* the very short pseudostalk would place the specimen with *E. caudata* King rather than with *E. filiformis.*

E. filiformis Macfady., Fl. Jamaica, II, 116 is listed in Index Kewensis. According to data given by Pritzel the date of publication would have been 1850 or a little earlier. However, Fawcett and Rendle, Fl. Jamaica, Vol. V, in a note on p. xiv, state that the second volume of Macfadyen's Flora was never published, the printing of it having been stopped owing to the sudden death of Dr. Macfadyen. This note is merely to draw attention to the fact that Macfadyen's name has no nomenclatorial standing, although Index Kewensis lists it as if it had.

72. **Eugenia caudata** King, Mat. F.M.P., No. 12, 105 (1901), pro maxime parte; Ridl., F.M.P., I, 740. *?E. filiformis* Duthie var. *parvifolia* Craib, Fl. Siam. Enum., I, 641 (1931). (Fig. 29*c, d*).

PENANG: West Hill, 2,000 feet, *Curtis 744,* 2,400 feet, *SFN 2653* (*Burkill*), 3,000 feet, *Nauen s.n.*
PERAK: sine loc., *Scortechini 392* (syntype); Maxwell's Hill, 2,500 feet, *Wray 2824, 3208* (syntypes), 4,000 feet, *Curtis 2007* (syntype), *Ridley 2991, 5344;* Larut, 1,800–2,500 feet,

Kunstler 2421 (syntype), 2,000–2,500 feet, *Kunstler 6262* (syntype), 4,000–4,600 feet, *Kunstler 3654* (syntype); Gunong Hijau, 5,000 feet, *Scortechini 444*, (syntype), *SFN 12768 (Burkill & Haniff)*; Gunong Batu Puteh, 3,400 feet, *Wray 472, 1176* (syntypes); Ulu Batang Padang, *Wray 1514* (? syntype, ? quoted by King as *1574*); Bubu Forest Reserve, *Forest Dept. FMS 29856.*

SELANGOR: Semangkok Pass, *Curtis 3758, Ridley 15591.*

PAHANG: Fraser Hill, *Forest Dept. FMS 22497, SFN 33160 (Corner).*

Distrib: Endemic.

A *shrub* or small *tree* up to about 12 metres tall; bark smooth entire then finely creviced, greyish brownish; inner bark pale greyish brownish drab. *Twigs* slender or very slender, terete, bark smooth, pale brownish or greyish. *Leaves* thinly coriaceous, lanceolate or ovate lanceolate or elliptic lanceolate, apex caudate acuminate, base cuneate and narrowed on to petiole, from c. 3 cm. × 1 cm. to 7 cm. × 3 cm., upper surface drying pale brown to blackish brown, slightly polished, smooth, minutely punctate, lower surface pale brown to reddish brown, dull, minutely black dotted or glandular pustulate; midrib narrowly impressed above, slightly elevate and keeled below; *primary nerves* numerous, spreading-ascending to a very obscure intramarginal nerve, almost or quite invisible on both surfaces; petiole slender, 3–6 mm. long.

Racemes terminal or axillary, up to c. 6 cm. long, very lax and few flowered, sometimes with 1–2 pairs of very slender spreading branches c. 2 cm. long, each bearing two terminal flowers; or almost unbranched with 5 flowers; *flowers* white, the calyces suffused red, sessile or on slender pedicels up to c. 5 mm. long; *calyx* campanulate or funnel shaped, c. 5 mm. long, contracted suddenly at base into a slender pseudostalk from 1–3 mm. long; lobes 4, equal, deciduous, broad and rounded or subacute, c. 2 mm. across and 1 mm. tall; *petals* 4, free or falling as a calyptra but not agglutinated, orbicular, obscurely gland dotted, c. 3 mm. diam.; *stamens* variable in length, reaching 12 mm., filaments slender, subulate; anthers ovate elliptic, c. 0·5 mm. long, connective gland small but distinct; *style* much stouter than filaments, and about as long as longest stamens; *ovary* 2-celled.

Fruit more or less globose, c. 1–1·5 cm. diam., crowned by the short calyx rim c. 6 mm. diam., seeds 1 or 2.

The small caudate acuminate leaves with almost invisible nervation and the few flowered very lax inflorescences distinguish this species.

King includes in his species and takes his specific name from *Myrtus caudata* Wall. Cat. 3631, *nomen nudum.* I have seen a sheet of this number in Herb. Calcutta, written up by King. If it is a Eugenia, which I doubt, it differs from *E. caudata* in the narrower and longer leaves, not black dotted below, with a different texture and venation. The specimen is sterile and is said to have been collected in Singapore, where *E. caudata* has not been found.

See note under *E. filiformis* Duthie.

73. **Eugenia oleina** Wight, Ill., II, 15. (1841); Craib, Fl. Siam. Enum., I, 653 (1931). *E. myrtifolia* Roxb., Fl. Ind., II, 490 (1832); Duthie in Hook, fil., F.B.I., II, 483; King, Mat. F.M.P., No. 12, 118; Ridl., F.M.P., I, 750; non E. myrtifolia Salisb. (1796), nec Sims (1821), nec Cambess. (1829). *E. acuminatissima* Kurz. var. *parva* Merr. in Philipp. Journ. Sci., I (Suppl.) 104 (1906). *E. parva* C. B. Rob., loc. cit., IV, 391 (1909). *E. sinubanensis* Elm., Leafl. Philipp. Bot., IV, 1424 (1912). *Syzygium myrtifolium* (Roxb.) DC., Prodr., II, 261 (1828); Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 182. (Fig. 29*e, f*).

PENANG: *Wallich*, fide King.

JOHORE: Kota Tinggi, *Ridley s.n.;* Sungai Rhu Reba, Jason Bay, *Corner s.n.;* Sungai Kambau, Sedili Besar, *SFN 28081* (*Corner*); Sungai Pendas, *SFN 32254* (*Corner*).

SINGAPORE: Sungai Morai, *Ridley s.n.*, 3633*a*; Changi, *Ridley 4572;* Sungai Jurong, *Ridley 4985;* Selitar, *Ridley 5001;* Jurong, *Ridley 8424;* Kranji, *Ridley 11847;* Woodlands Reserve, *SFN 36959* (*Ngadiman*), *Corner s.n.;* Economic Gardens, *Ridley 12195;* Botanic Gardens, *Ahmat s.n.*, *Henderson s.n.;* sine loc.; *Wallich 3571.*

Distrib: Burma, Siam, Sumatra, Anamba Islands, Borneo, Philippines.

A small *tree,* trunk sometimes shortly stilt rooted at base; bark light greyish brown or light orange brown, slightly flaky or very slightly papery flaky. Youngest *twigs* sharply 4-angled, bark smooth, dark brown, older twigs terete with brown slightly flaky bark. *Leaves* thickly coriaceous, lanceolate or oblong lanceolate to broadly elliptic ovate, apex acute or acuminate, base cuneate, 3·5–8 cm. long, 1–4 cm. broad; both surfaces drying pale brown to reddish brown, the lower usually paler, both minutely punctate or black dotted; midrib narrowly impressed above, slightly elevate and keeled below; primary nerves numerous, almost invisible, impressed, as are the reticulations, on both surfaces; petiole short, less than 5 mm. long.

Panicles terminal or from upper axils, often clustered at tips of twigs, peduncled, c. 4–5 cm. long, branches lax, spreading, ascending, they and rachis and peduncle slender, stiff, sharply 4-angled with pale or reddish brown smooth or somewhat pustulate bark; *flowers* white or the calyx green suffused purplish brown, sessile or on very short rather stout pedicels, in twos and threes at branchlet ends; buds broadly clavate, c. 4 mm. long; *calyx* funnel shaped or somewhat campanulate, c. 3·5 mm. long, tapered to base and contracted into a pseudostalk c. 1 mm. long; lobes 4, broad and rounded, subpersistent, evident in bud, c. 1 mm. across and 0·5 mm. tall, reflexed after anthesis; *petals* falling as a calyptra, gland dotted, often not completely agglutinated and the outer one at least partially or wholly free, orbicular, c. 3·5 mm. diam.; *stamens* numerous, variable in length, up to c. 5 mm. long, filaments slender, subulate, anthers c. 0·3–0.4 mm. long, connective gland obscure; *style* much stouter than filaments, c. 6 mm. long; *ovary* 2-celled.

Fruit small, broadly obovoid or pyriform, c. 5 mm. long and 6–7 mm. across, dark red to reddish purple, then black when ripe; apex deeply and widely excavate, umbilicus c. 3 mm. diam., its rim with remains of 4 enlarged lobes; pericarp juicy fleshy, up to c. 2 mm. thick; seed 1, more or less boat shaped, c. 5–6 mm. × 3–4 mm., testa rather tough and leathery, adhering to cotyledons; cotyledons side by side, conspicuously gland dotted, one often half as big as the other; inner faces folded, with the large hypocotyle lying in the fold, reaching the periphery of the seed and there conspicuous. Germination epigeal.

According to Roxburgh this species was first found in Sumatra, whence it was sent to Calcutta and cultivated. Presumably Roxburgh described his *E. myrtifolia* from specimens from these cultivated plants, and I have therefore taken as typical specimens ticketed as cultivated in Hort. Bot. Calcutta. The Malayan collections agree well with those from Calcutta with a few small variations. In the more recent collections the leaves dry much paler. *Ridley 5001* has the reticulations raised on the under surface of the leaf, and *Ridley 11847* has leaves broader than the type with the reticulations dark and well marked below, but not raised.

I have seen type material of *E. parva* C. B. Rob., and *E. sinubanensis* Elm., and have no hesitation in reducing them, as Merrill and Perry do. The Philippine specimens are recorded from ridge forest up to 900 m., while in Malaya the species appears always to be a lowland one, usually near the sea behind mangrove.

When Roxburgh published his *E. myrtifolia* the specific epithet had already been used in Eugenia. The next oldest name appears to be supplied by *Syzygium oleinum* Wall., *nom. nud.*, which was transferred to Eugenia by Wight, loc. cit. This might also be considered a *nomen nudum*, for Wight gave no description or reference to a figure. But the name seems to be validated by his remarks—"These two" (E. (S.) myrtifolia Roxb. and E. (S.) oleina R.W.) "if distinct, are so like each other that I cannot see by what characters they can be defined, I look upon them, judging from specimens only, as identical". Merrill and Perry do not admit the validation of the name by Wight, and if they are correct it never has been validated. If Merrill and Perry's synonymy is correct, which I have not been able to check, the next oldest available epithet appears to be supplied by *Syzygium campanulatum* Korth., Nederl. Kruidk. Arch., I, 203, (1847).

74. **Eugenia Benjamina** King, Mat. F.M.P., No. 12, 106 (1901), excl. specimina sumatrana; Ridl., F.M.P., I, 734, excl. distrib. (Fig. 30*a*).

PERAK: Waterfall Hill, Taiping, 1,200 feet, *Wray 2632* (syntype); Maxwell's Hill, 2,500 feet, *Wray 2797, 3204* (syntypes); Larut, 1,500–2,000 feet, *Kunstler 7306* (syntype).
Distrib: Endemic.

A *shrub* or small *tree*. *Twigs* slender, terete, bark smooth, pale brown. *Leaves* thinly coriaceous, narrowly elliptic, oblong elliptic, or oblanceolate elliptic, apex caudate acuminate, acumen up to 1·5 cm. long, base cuneate; up to c. 7·5 cm. long and 3·5 cm. broad; both surfaces drying pale brown and conspicuously and closely gland dotted; midrib impressed above, elevate below and pustulate; *primary nerves* numerous and close together, meeting in a nearly straight intramarginal nerve close to leaf margin, raised and fine on both surfaces, the close reticulation also raised on both surfaces and as distinct as primaries; petiole slender, wrinkled and pustulate, narrowly channelled above, c. 5 mm. long.

Racemes axillary and terminal, shorter than leaves, reaching c. 3 cm. long, few flowered but rather dense, rachis short, stout, angled, reddish or greyish scurfy; *flowers* pale green, filaments white, red at base, on rather stout pedicels of varying length, sometimes sessile, buds globose clavate 8–10 mm. long; *calyx* c. 7 mm. long, rather abruptly contracted below lobes into a stout cylindric angled tube c. 5 mm. long; lobes 4, spreading, subpersistent, ovate rounded, rather thick with thin margins, conspicuously pellucid dotted, c. 3 mm. across and 2·5 mm. tall; *petals* 4, free, orbicular, with conspicuous pellucid glands, c. 5 mm. diam.; *stamens* numerous, filaments slender, subulate, with scattered pustulate glands, reaching 10–11 mm., anthers broadly ovate oblong, c. 0·6–0·7 mm. long, without connective gland; *style* stouter than filaments, glandular pustulate, c. 10 mm. long; *ovary* 2-celled.

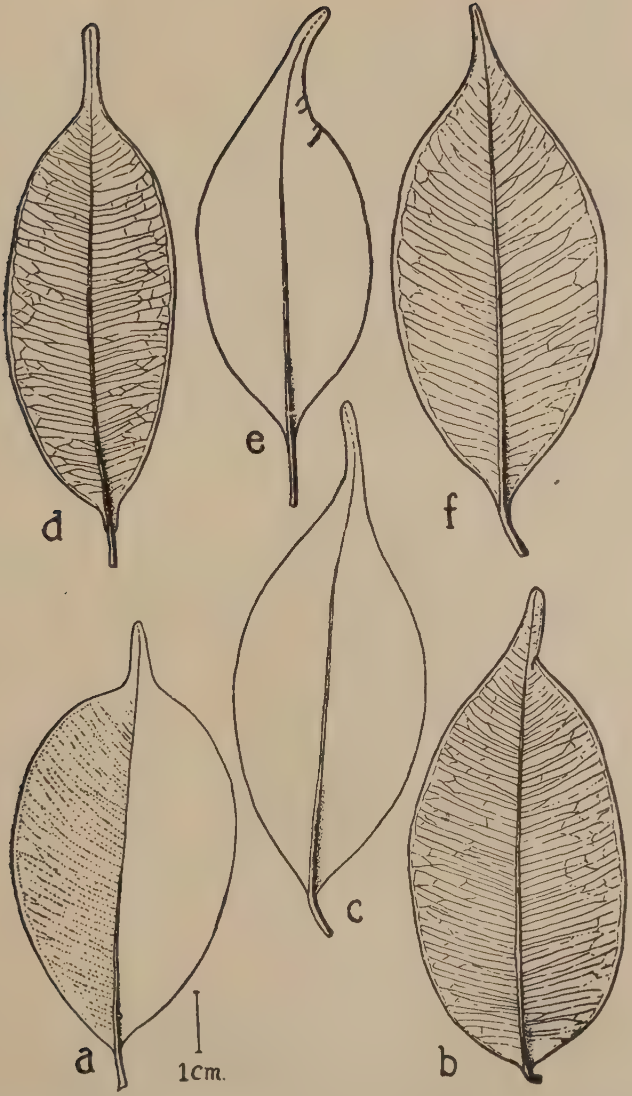

Fig. 30. a, *E. Benjamina;* b, c, *E. syzygioides;* d, *E. castanea;* e, f, *E. longifloral.*

Fruit "dark claret colour, waxy" (Kunstler), crowned by the deeply 4-lobed calyx limb.

The caudate acuminate glandular leaves with close raised venation on both surfaces, the very short few flowered condensed inflorescences with rather large flowers and scurfy rachis, and the conspicuous glands on sepals, petals, stamens and style distinguish this species.

King includes here *Forbes 2046* from 6,700 ft. in Sumatra, which he says "agrees absolutely in leaf with those collected in Perak", and describes the fruit of this specimen as the ripe fruit of *E. Benjamina.* He describes the fruit of *Kunstler 7306* as unripe, but judging from Kunstler's field note in which he says "fruit dark claret colour, waxy", the fruit of this specimen is nearly, if not quite ripe. In my opinion Forbes' specimen does not agree with the Perak collections, the leaves being much thicker with coarser and more distant nerves, and this, along with the much larger fruit without persistent calyx lobes, shows it to belong to some other species.

75. **Eugenia syzygioides** (Miq.) comb. nov. (Fig. 30*b, c*).

Calyptranthus caryophyllifolia Bl., Bijdr., 1089 (1825), non Willd. (1796). *Jambosa syzygioides* Miq., Fl. Ind. Bat., I, i, 431 (1855). *Syzygium syzygioides* (Miq.) Merr. & Perry in Journ. Arn. Arb., XIX, 109 (1938); Mem. Amer. Acad. Arts & Sci., XVIII, 3, 171. *Eugenia cymosa* Wight, Ill., II, 97 (1841); Duthie in Hook. fil., F.B.I., II, 482; King, Mat. F.M.P., No. 12, 100; Gagnep. in Fl. Gen. Indo-Ch., II, 823; Koord. & Valet. in Meded. Lands Plantent., XL, 126; Atlas Baumart. Java, III, fig. 493; Ridl., F.M.P., I, 737, pro parte; Craib, Fl. Siam. Enum., I, 637; Corner, Wayside Trees of Malaya, p. 496, pl. 147; non E. cymosa Lamarck (1789).

Common in the lowlands from Langkawi and Trengganu to Singapore, chiefly in secondary growth, and often on rocky and sandy seashores.

Distrib: Burma, Assam, Siam, Andamans, Indo-China, Malaysia.

A small to large *tree;* bark dull reddish brown or greyish brown, fibrous, in young trees nearly smooth, becoming longitudinally fissured, shaggy and flaky. *Twigs* slender, terete, drying greyish to reddish brown, bark smooth or somewhat flaky. *Leaves* thinly coriaceous, lanceolate or oblong lanceolate to elliptic or ovate elliptic, apex acuminate or caudate acuminate, base cuneate, from c. 4–10 cm. long and 1·5–5·5 cm. broad, upper surface drying reddish brown to nearly black, more or less polished, minutely punctate, lower surface slightly paler, dull, eglandular; midrib narrowly impressed above, elevate below; *primary nerves* numerous (to about 25 pairs) and close together, slightly ascending and running straight or curving up rather irregularly to an almost straight intramarginal nerve c. 1 mm. or less from leaf margin, raised, fine and distinct below as are the secondaries and close reticulations which are hardly if at all distinguishable from primaries, less distinct above, sometimes raised, sometimes slightly impressed, sometimes almost invisible; petiole slender, channelled above, less than 1 cm. long.

Panicles axillary or terminal, more usually axillary, not more than c. 6 cm. long, usually shorter, often clustered, peduncled, sometimes lax, sometimes rather dense, branches very slender, distant, spreading-ascending, compressed or 4-angled with dark bark, bracts and bracteoles minute, subpersistent, ovate acute; *flowers* white with reddish calyx, *sessile* in threes or fours at branchlet ends; *calyx* campanulate, c. 6 mm. long and 3 mm. across mouth, contracted rather abruptly into a slender pseudostalk 2–2·5 mm. long; lobes 4, subpersistent, very small, triangular, blunt, c. 1 mm. across base and less than 0·5 mm. tall; *petals* 4, free, orbicular, 2–2·5 mm. diam., sparsely pellucidly glandular; *stamens* numerous, filaments slender, subulate, up to c. 4 mm. long, anthers broadly oblong, c. 0·3–0·4 mm. long, connective gland small but distinct; *style* much stouter than filaments, subulate, c. 5 mm. long; *ovary* 2-celled, multiovulate.

Fruit ripening dark cherry red to purple black, globular or more or less depressed globular, 8–12 mm. diam., with conspicuous calyx rim c. 1 mm. high; pericarp 1–3 mm. thick, fleshy, seed oblong to globose, testa thick, rather leathery, or crustaceous, adhering closely to cotyledons; cotyledons side by side, nearly equal, inner faces plane or slightly concave, point of attachment to hypocotyle close to periphery; plumule and radicle small.

This common plant has been for many years interpreted as *E. cymosa* Lamk., although Gagnepain in Fl. Gen. Indoch., *loc. cit.*, indicates that the interpretation is erroneous. I have seen a photograph of the type of Lamarck's species, from which it is obvious that it is not our plant. The specimen consists of a twig with two leaves, and inflorescence and two detached flowers. The leaves are rounded or very slightly cordate at the base, broadest below the middle and with an acute acumen. The leaves of the Malayan plant are narrowed or cuneate at the base, the blade is almost always broadest about the middle, and the acumen is blunt. The flowers of *E. cymosa* Lamk. are much larger than those of our plant and the calyx of quite a different shape.

A note by Dr. Gagnepain on Lamarck's type reads: "Ce rameau n'appartient pas a la même espèce que les fleurs. Voyez les echantillons de l' *Eugenia cymosa* dans le herbier général. Mai 1917." So that perhaps the type is a mixture. In any case no part of it has anything to do with our plant.

Merrill and Perry in Journ. Arn. Arb., *loc. cit.*, are the first to use the correct specific epithet for our plant, although their name might be liable to rejection as a tautonym. I have seen authentic material of *Jambosa syzygioides* Miq. from the Rijks Herbarium in Leiden, namely specimens bearing the names *Jambosa syzygioides* and *Calyptranthus caryophyllifolia* in Miquel's and Blume's handwriting and there can be no doubt that our plant belongs here.

76. **Eugenia castanea** Merr. in Journ. Roy. As. Soc. Str. Br., LXXVII, 212 (1917); LXXIX, 22 (1918). *Eugenia cymosa* var. *concinna* King saltem quoad *Kunstler 10521*, non Syzygium concinnum Wall. *Syzygium castaneum* (Merr.) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 156 (1939). (Fig. 30*d*).

PERAK: Ulu Bubong, *Kunstler 10521*.
JOHORE: Sungai Kayu Ara, Mawai-Jemaluang road, *SFN 29249* (*Corner*); Sungai Berassau, Mawai-Jemaluang road, *SFN 28977* (*Corner*).
Distrib: Borneo.

A small *tree;* bark dull reddish brown, nearly smooth. Youngest *twigs* 4-angled, brown when dry and distinctly puberulent-papillose, the older twigs terete with brown smooth or rather flaky bark. *Leaves* thinly coriaceous, narrowly oblong to oblong elliptic, apex caudate acuminate, the acumen c. 1 cm. long, obtuse, base cuneate, up to c. 8 cm. long and 2·5 cm. broad (in Malayan material), upper surface drying dark brown to blackish brown, more or less polished, very minutely or obscurely punctate or minutely rugulose pustulate, lower surface reddish brown, minutely glandular pustulate; midrib narrowly impressed above, elevate below; *primary nerves* 25–30 pairs, close together, spreading, meeting in an almost straight intramarginal nerve c. 1 mm. from leaf margin, slightly raised above and very faint, fine but distinct below as are the equally distinct secondaries and reticulations; petiole slender, up to c. 5 mm. long.

Panicles terminal or axillary, up to c. 7·5 cm. long, peduncled or branched from base, the rachis and branches slender, 4-angled and compressed, minutely puberulent-papillose; *flowers* white, sessile in threes at the ends of the short ultimate branchlets, buds narrowly clavate, c. 7 mm. long; *calyx* after anthesis funnel shaped, c. 6–7 mm. long, gradually narrowed into a slender pseudostalk c. 3–4 mm. long, the lower half minutely puberulent-papillose; lobes 5, persistent, very shallow and obscure, broad and rounded or broadly triangular subacute; *petals* falling as a calyptra but free, or slightly agglutinated, broadly ovate or orbicular, pellucidly gland dotted, c. 2–3 mm. diam.; *stamens* numerous, filaments slender, subulate, apparently glandular, up to c. 6 mm. long, anthers ovate or oblong, c. 0·3 mm. long, connective gland inconspicuous; *style* stouter than filaments, c. 7 mm. long, glandular pustulate; *ovary* 2-celled

Fruit (very young) globular or ovoid, c. 4 mm. diam., gland dotted, crowned by the conspicuous calyx rim c. 1·5 mm. tall and 2 mm. across, bearing the persistent calyx lobes, base contracted into a pseudostalk.

This species differs from *E. syzygioides* particularly in the scurfy inflorescence branches and young twigs and the less abrupt narrowing of the calyx into the pseudostalk. The leaves tend to be narrower and more oblong than those of *E. syzygioides.*

77. **Eugenia pseudosyzygioides** Henderson in Gardens' Bulletin, Singapore, XI, 315, fig. 9 (1947).

South Trengganu: Bukit Kajang, 500 feet, *SFN 30421, 30451, 30497* (*Corner*).
Perak: Larut, within 100 feet, *Kunstler 3422.*
Distrib: Endemic.

A *tree* 18–24 m. tall, c. 25–60 cm. diam. 2 m. from ground, trunk cylindric. *Bark* dull greyish, pallid, smooth, entire, faintly marked with transverse ridges but even in other places; inner bark thin, greyish brown; wood pallid buff, darkening on exposure. *Twigs* slender, terete, youngest brown or reddish brown, older ones whitey brown to pale grey, bark smooth or finely cracked. *Leaves* thinly coriaceous, ovate, ovate lanceolate to oblong lanceolate, or narrowly elliptic, apex caudate acuminate, the acumen up to c. 2 cm. long, base cuneate, from c. 4 cm. × 2 cm. to 9·5 cm. × 4·5 cm.; upper surface drying dull brown to lead colour, lower usually paler, brown to reddish brown; petiole slender, wrinkled and pustulate below, 3–5 mm. long; midrib narrowly channelled above, raised below, more or less pustulate, especially towards petiole; *primary nerves* numerous, close and parallel, not distinguishable from secondaries, raised on both surfaces, sometimes much darker than surrounding leaf surface; intramarginal nerve very close to and partly hidden by the revolute leaf margin; upper surface minutely punctate, lower sparsely black dotted.

Panicles axillary and terminal, usually 4–5 cm. long but reaching c. 7 cm., peduncle and branches slender, spreading, compressed or angled, with dark, longitudinally wrinkled, often pustulate bark; *flowers* sessile in threes at ends of very short branchlets, or these branchlets so reduced that the flowers appear umbellately arranged; buds c. 5–6 mm. long; *calyx* tube funnel shaped, usually more or less pustulate, narrowing to a slender pseudostalk; lobes 5, broad, shallow, rounded, c. 0·5 mm. wide and 0·3 mm. tall; *petals* calyptrate or occasionally free, orbicular; *stamens* up to c. 5–6 mm. long, anthers oblong, c. 0.4 mm. long with conspicuous brown connective gland; *style* rather stout, 5–6 mm. long; *ovary* 2-celled. *Fruit* unknown.

This species is evidently closely allied to *E. syzygioides*, but differs in the longer pseudostalk and the funnel shaped pustulate calyx tube. Sterile material can hardly be distinguished from *E. syzygioides* in the herbarium except perhaps by the usually narrower and more oblong leaves, but in the field the two species are distinct, *E. pseudosyzygioides* having a smooth pale bark, and *E. syzygioides* a more or less fissured and flaky dark red or fuscous brown bark.

78. **Eugenia praestigiosa** Henderson in Gardens' Bulletin, Singapore, XI, 318, fig. 10 (1947).

PERAK: without locality, *Scortechini s.n.*

Known only from this collection, consisting of 5 sheets in Herb. Calcutta.

?A tree, *twigs* terete, with smooth bark, dark brown or dark reddish brown, in places pale grey and finely cracked. *Leaves* coriaceous, oblong lanceolate or oblong elliptic, up to c. 9 cm. × 3·75 cm., apex acuminate, base narrowed, upper surface drying olivaceous brown or reddish brown, slightly shining, minutely and densely punctate, lower surface paler and duller, minutely and densely black pustulate-dotted; midrib sunk above, raised below and pustulate except at apex, longitudinally wrinkled; *primary nerves* c. 12–15 pairs, very fine and slender above, slightly raised, fine below, but rather more conspicuous than on upper surface, raised, meeting in a fine intramarginal nerve c. 1 mm. from the recurved leaf margin; secondaries and reticulations fine and raised below but distinctly less conspicuous than primaries; petiole c. 1 cm. long, rather slender, deeply channelled above.

Inflorescences crowded, terminal or in upper axils, spiciform or paniculate with few branches, up to c. 4·5 cm. long, rachis compressed or angled with strongly striate pale brown bark. *Flowers* sessile, crowded at or near ends of inflorescence branches; *calyx* in bud c. 6–6·5 mm. long and 3·5–4 mm. across mouth, obconic or campanulate and tapering gradually to base, pseudostalk very short, not evident, the mouth rather abruptly expanded into 4 deep rounded persistent lobes c. 2 mm. high and 3 mm. across; *petals* 4, free, reflexed after anthesis, more or less orbicular, c. 5 mm. across, gland dotted; *stamens* numerous, filaments slender, up to c. 9–10 mm. long, anthers oblong, c. 0·7–0·8 mm. long, connective gland obscure or absent; *style* rather stout, tapering to apex, c. 8 mm. long; *ovary* 2-celled with several or many ovules in each cell. *Fruit* unknown.

Distinctive amongst Malayan species in the short crowded inflorescences and the crowded flowers with conspicuous calyx lobes and petals. The inflorescences recall those of *E. rugosa* but the flowers and foliage are quite different. The flowers resemble those of *E. longiflora* but are shorter, with more conspicuous petals.

79. **Eugenia longiflora** (Presl) F. Vill., Nov. App. Fl. Filip., 86 (1880); Gagnep. in Fl. Gen. Indo-Ch., II, 822; Craib, Fl. Siam. Enum., I, 650; Corner, Wayside Trees of Malaya, p. 499, pl. 151, fig. 168. *Syzygium longiflorum* Presl, Bot. Bemerk., 70 (1844). *Myrtus lineata* Bl., Bijdr., 1087 (1826), non Sw. (1800). *Jambosa lineata* DC., Prodr., III, 287 (1828). *Syzygium lineatum* (DC.) Merr. & Perry in Journ. Arn. Arb., XIX, 109 (1938). *Eugenia lineata* Duthie in Hook. fil., F.B.I., II, 487 (1878); King, Mat. F.M.P., No. 12, 99; Ridl., F.M.P., I, 738; Koord. & Valet., Atlas Baumart. Java, III, fig. 485; non DC. (1828). *Jambosa rubricaulis* Miq., Fl. Ind. Bat., I, i, 429 (1855). *Eugenia rubricaulis* (Miq.) Duthie in Hook. fil., F.B.I., II, 487. *Jambosa Teysmanni* Miq., loc. cit., 429. *Eugenia Teysmanni* Koord. & Valet. in Meded. Lands Plantent., XL, 164 (1900). *E. marivelesensis* Merr. in Philipp. Journ. Sci., I, Suppl., 106 (1906). *E. Miquelii* Elmer, Leafl. Philipp. Bot., IV, 1441 (1912). *E. simulans* King, Mat. F.M.P., No. 12, 128 (1901), pro parte. *E. longicalyx* Ridl. in Journ Bot., LXVIII, 11 (1930), fide Merrill & Perry. (Fig. 30 *e*, *f*).

Very common in the lowlands from Kedah to Singapore, in secondary growth, by rivers, and in forest.
Distrib: Burma, Indo-China, Siam, Malaysia, Philippines.

A small or medium sized *tree*, old trees sometimes large —up to c. 22 m. tall—and spreading, occasionally stilt rooted; bark smooth and entire or closely and faintly transversely rugose with persistent leaf scars, eventually shallowly flaky-cracked in small thin superficial pieces, not papery flaky, pinkish- or rufous-fawn; inner bark fawn or fawn drab. *Twigs* slender, terete, bark smooth, drying pale brown or reddish brown. *Leaves* thinly coriaceous, elliptic lanceolate or ovate lanceolate to narrowly elliptic or oblong elliptic, apex rather abruptly acuminate or caudate acuminate, base cuneate, from c. 5–11 cm. long and 2–5 cm. broad; upper surface shining, drying olivaceous brown to dark brown, usually minutely and closely punctate, lower surface pale brown to reddish brown, usually with scattered black gland dots; midrib impressed above, elevate below; *primary nerves* numerous and close together, indistinct above and slightly impressed, raised below and very fine, more distinct than on upper surface, intramarginal nerve shallowly looped, c. 1 mm. from leaf margin, secondaries and close reticulations below almost or quite as distinct as primaries; petiole slender 0·5–1 cm. long.

Panicles terminal or from upper axils, shortly pedunculate or branched from base, or clustered, rather dense, up to c. 10 cm. long and wide, rachis and branches slender, 4-angled, the youngest branchlets compressed, bark dark brown and smooth when dry; *flowers* white or pale green or pale pink, fragrant, in threes or twos or sometimes solitary at branchlet ends, sessile or shortly pedicellate, the minute broad bracts and bracteoles subpersistent, buds globose clavate, c. 7 mm. long; *calyx* cylindric funnel shaped, somewhat constricted below lobes and tapering gradually to base, c. 6 mm. long, striate and somewhat 4-angled; lobes 4, nearly equal, broadly oblong, rounded or truncate, conspicuous, persistent, sometimes conspicuously gland dotted, c. 2–3 mm. across and 2 mm. tall; *petals* 4, free, thin, orbicular, sparsely pellucidly gland dotted, c. 3–4 mm. diam.; *stamens* numerous, filaments slender, subulate, up to c. 1·3 cm. long, anthers oblong ovate, c. 0·6 mm. long, without connective gland; *style* much stouter than filaments, c. 10 mm. long; *ovary* 2-celled.

Ripe *fruit* oblong ovoid, up to c. 1·3 cm. long and 1 cm. across, opaque white, crowned by the 4 persistent incurved calyx lobes c. 1·5 mm. high, surrounding a deep narrow excavation c. 3 mm. diam.; style not persistent but leaving a brown scar at base of excavation; pericarp pure white, pithy-pulpy, sweetish and faintly aromatic, c. 2–3 mm. thick; seed oblong ovoid, c. 1 cm. long and 0·6 cm. across, testa brown, rather thick, crustaceous, adhering closely to the cotyledons; cotyledons superposed, nearly equal or rather unequal, outer surfaces smooth, pale green, very minutely gland dotted; inner faces plane or nearly so, attachment to hypocotyle near the centre or the periphery by very short broad stalks, radicle and plumule small, often faintly tinged purplish pink. Germination hypogeal, young shoot deep pink, strongly 4-angled.

I have examined a fragment of the type of *Syzygium longiflorum* from Presl's herbarium (collected by Cuming in the Philippines) and have no doubt our plant is the same. Indeed the Malayan material matches it more closely than the bulk of the Philippine material identified with it, the latter having as a rule larger flowers.

E. longiflora and *E. tumida* have been somewhat confused in Herb. Singapore and Herb. Calcutta and possibly elsewhere, due to the close similarity in foliage. Sterile material or material in young bud is not determinable with certainty, but in flowering or fruiting specimens the differences are obvious and may be tabulated conveniently as follows:

E. longiflora	*E. tumida*
1. Calyx lobes deep, oblong, *persistent.*	1. Calyx lobes broad, shallow, *dropping soon after stamens.*
2. Calyx tube not swollen above base, more or less 4-angled after anthesis.	2. Calyx tube usually slightly swollen just above base, not 4-angled.
3. Fruit *oblong* or *ovoid,* not more than about *1·9 cm. long,* crowned by the *4 enlarged calyx lobes, pure white* when fully ripe.	3. Fruit *globose* or depressed globose, c. *2 cm. diam.,* crowned with *narrow tubular calyx rim, dark brownish green* when fully ripe.

80. **Eugenia tumida** Duthie in Hook. fil., F.B.I., II, 487 (1878); Craib, Fl. Siam. Enum., I, 665; Corner, Wayside Trees of Malaya, p. 504, fig. 168. *E. pyrifolia* (Bl.) Duthie, loc. cit., 487 (1878); King, Mat. F.M.P., No. 12, 99; Ridl., F.M.P., I, 738; non Desv. (1825). *Calyptranthus pyrifolia* Bl., Bijdr., 1090 (1826). *Syzygium pyrifolium* (Bl.) DC., Prodr., III, 261 (1828); Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 182. (Fig. 31*a*).

Common in the lowlands from Kedah to Singapore, in secondary growth and forest. There are two collections only from Penang, *Cantley's collector 3128* and *Phillips s.n.* The species has not been recorded again from Penang and these collections may be wrongly localised.

Distrib: Siam, Borneo.

A small *tree*, bark pinkish grey, nearly smooth, very like that of *E. longiflora.* Youngest *twigs* 4-angled, older ones terete, smooth, drying pale brown to whitish brown. *Leaves* coriaceous, elliptic lanceolate or ovate lanceolate to narrowly elliptic or elliptic oblong, apex rather abruptly acuminate, base cuneate or narrowed rather abruptly on to petiole, c. 4 cm. × 1·5 cm. to 11 cm. × 6 cm.; upper surface shining, drying brown to blackish brown, sometimes very minutely punctate, lower surface dull, paler, usually minutely gland dotted; midrib impressed above, elevate below; *primary nerves* numerous and close together, indistinct above and slightly impressed, raised below and very fine, usually distinct, intramarginal nerve irregularly looped, close to leaf margin; secondaries and reticulations indistinct or invisible above, very fine below, slightly less distinct than primaries; petiole slender, c. 1 cm. long.

Panicles axillary and terminal, up to c. 10–11 cm. long and about as wide, sometimes longer, many flowered, pyramidal or corymbose, usually long peduncled, rather laxly branched, the rachis, branches and branchlets slender, acutely 4-angled or sometimes narrowly winged, bark brown, smooth or slightly pustulate, bracts and bracteoles minute, triangular acute, subpersistent; *flowers* fragrant, calyx yellowish, stamens white, sessile, in twos, threes or clusters at ends of the short ultimate branchlets, buds clavate, c. 6–6·5 mm. long; *calyx,* after anthesis, more or less funnel shaped or narrowly campanulate, c. 5·5–6 mm. long, the tube vertically striate, very gently tapered to about half, then slightly constricted, and tapered into a stout, not well defined pseudostalk, c. 3 mm. long, slightly swollen about the ovary; lobes 4, deciduous, broad shallow and rounded, less than 0·5 mm. tall; *petals* 4, free or falling as a calyptra with the two outer petals free and the inner more or less agglutinated, orbicular, conspicuously pellucidly gland dotted, c. 2·5 mm. diam.; *stamens* numerous, filaments slender, subulate, outer ones reaching c. 7–8 mm., usually somewhat shorter, anthers oblong, c. 0·6 mm. long, connective gland small and inconspicuous; *style* subulate, much stouter than filaments, c. 7 mm. long; *ovary* 2-celled.

Fruit pale green, finally greenish brown to dull brown, often slightly vertically ridged, depressed globose, c. 2·5 cm. across and 2 cm. high, the apical calyx tube remains consisting of a narrow small tube c. 3 mm. diam. and 1 mm. high; pericarp pithy, slightly juicy, sweet, 2–4 mm. thick, seed lying more or less loosely within; testa white, turning brown, thick, pithy, crustaceous, adhering closely to cotyledons; cotyledons side by side, surfaces slightly wrinkled, shining, pale green or almost white, minutely gland dotted; inner faces nearly plane, only slightly ridged, attachment nearly central, sessile or with exceedingly short broad stalks, plumule rather large, radicle small. Germination hypogeal.

Two collections from Johore—Bukit Tinjau Laut, *SFN 37086* (*Ngadiman*) and Mawai, *SFN 34707* (*Ngadiman*) differ from *E. tumida* in the rather thicker leaves with spaced primary nerves, bark of trunk and twigs paler, inflorescence branches stouter, compressed and not sharply angled, and the stamens a little longer. The shape of the calyx is that of *E. tumida.*

81. **Eugenia linocieroidea** King, Mat. F.M.P., No. 12, 118 (1901); Ridl., F.M.P., I, 749. (Fig. 31*b*).

PERAK: Relau Tujor, 200 feet, *Wray 1898, 2595* (syntypes); Gopeng, within 100 feet, *Kunstler 4580* (syntype); Batang Padang, 300–500 feet, *Kunstler 7980, 8094* (syntypes).

SELANGOR: Rantau Panjang, *Forest Dept. FMS 12776;* Ginting Simpah, *Forest Dept. FMS 29803.*

SINGAPORE: Bukit Timah, *SFN 34775* (*Henderson*), *SFN 34982* (*Corner*), *SFN 36116* (*Kiah*).

Distrib: Endemic.

A *tree* up to c. 18 m. tall, bark pinkish brown, smooth or finely tesselately wrinkled or creviced or irregularly pimply; inner bark very thick, c. 2 cm., dark blood red with sticky sap. Young *twigs* obtusely or acutely 4-angled, older twigs terete, bark brown, nearly smooth. *Leaves* coriaceous, lanceolate or oblong lanceolate or elliptic lanceolate, or elliptic to ovate elliptic, apex acuminate or caudate acuminate, base cuneate, from c. 3·5 cm. to 8 cm. long and 1·5 cm. to 4 cm. broad; upper surface shining, drying from brownish green to blackish brown, minutely punctate, lower surface paler and duller, black dotted; midrib impressed above, elevate below; *primary nerves* numerous and close together, ascending slightly and running straight to an intramarginal nerve very close to the leaf margin, very fine and raised on both surfaces, or almost invisible above, reticulations close, usually very slightly less distinct than primaries; petioles very slender, from c. 3–10 mm. long.

Panicles terminal or from upper axils, up to c. 6 cm. long and 8 cm. across, much branched and densely flowered, the branches spreading-ascending, obtusely 4-angled with smooth reddish brown bark, the ultimate branchlets acutely angled or almost winged; *flowers* white, sessile or shortly pedicelled, in threes or clusters at branchlet ends, buds globose clavate c. 7 mm. long; *calyx* c. 5 mm. long, funnel

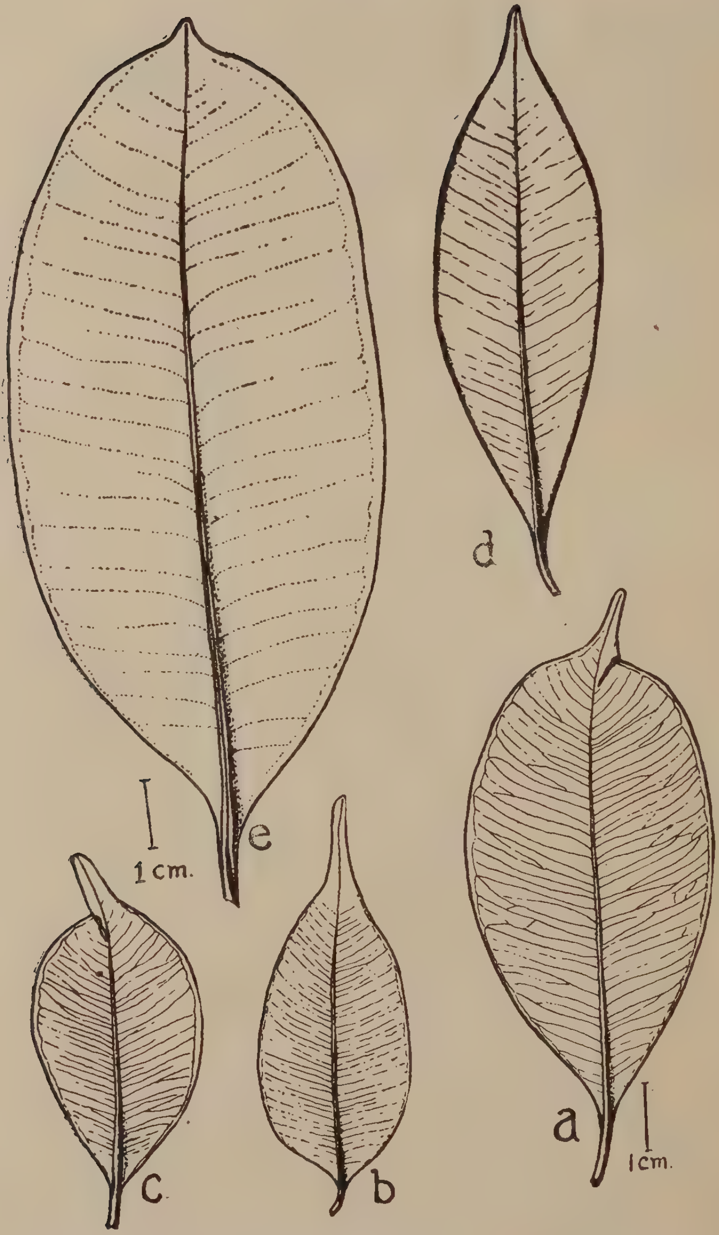
e
1 cm.
d
c
b
a
1 cm.

Fig. 31. a, *E. tumida;* b, *E. linocieroidea;* c, *E. goniocalyx;* d, *E. cyrtophylloides:* e, *E. cerina.*

shaped, contracted below lobes into a stout, tapering, angled and ridged tube; lobes 4, persistent, broadly ovate rounded, c. 2 mm. across and 1·5 mm. tall; *petals* 4, free, orbicular, 3–3·5 mm. diam.; *stamens* numerous, up to 7–8 mm. long, filaments slender, subulate, anthers broadly elliptic oblong, c. 0·4 mm. long, without connective gland; *style* stouter than filaments, c. 7 mm. long; *ovary* 2-celled.

Fruit oblong globose, vertically ridged or corrugate or almost smooth, c. 1 cm. long, apex with the 4 reddish, swollen, incurved calyx lobes; seed 1, cotyledons sessile, attached to hypocotyle near their centres, inner faces almost plane; germination hypogeal.

This species resembles *E. longiflora* but differs from it in the very thick bark, the stouter inflorescence branches, the more angled calyx tube and the different fruit.

The specimens from Bukit Timah, Singapore differ from the rest in their rather broader leaves and shorter panicles.

82. **Eugenia goniocalyx** Ridl., F.M.P., V (Suppl.), 309 (1925). (Fig. 31*c*).

PAHANG: Fraser Hill, 4,000 feet, *SFN 11456* (*Nur*), type collection; Perak-Pahang boundary, Cameron Highlands, *Forest Dept. FMS 28109;* Sungai Yatang, Cameron Highlands, *Forest Dept. FMS 34016;* Brinchang, Cameron Highlands, 5,000 feet, *SFN 31288* (*Holttum*).

Distrib: Endemic.

A *tree* c. 12 metres or more tall. Youngest *twigs* slender, 4-angled, older ones terete, drying brown and nearly smooth. *Leaves* coriaceous, elliptic or broadly oblong elliptic, apex rather abruptly cuspidate, the cusp blunt, base cuneate, up to c. 5·5 cm. long and 3·5 cm. broad, upper surface shining, drying olivaceous or dark brown, sometimes very minutely punctate, lower surface dull, paler, sometimes glandular pustulate; midrib deeply and narrowly impressed above, elevate below; *primary nerves* numerous and close together, meeting in a looped intramarginal nerve c. 1 cm. from the recurved leaf margin, raised on both surfaces, fine but distinct, especially below; secondaries and reticulations almost as distinct as primaries; petiole slender, up to 6–7 mm. long.

Panicles terminal or from uppermost leaf axils, up to c. 5 cm. long, densely flowered, the branches short and rather stout, 4-angled; *flowers* white, usually in threes at branchlet ends, sessile or shortly pedicelled, buds clavate, 8–9 mm. long; *calyx* after anthesis funnel shaped, c. 7–8 mm. long, narrowed gradually to base from below lobes, striate and sharply 4-angled; lobes 4, persistent, spreading, broad and rounded, c. 3 mm. across and 2 mm. tall; *petals* 4, free, orbicular, concave, c. 5 mm. diam.; *stamens* numerous, filaments slender, subulate, reaching c. 1·8 cm. long, anthers elliptic or elliptic oblong, c. 0·7–0·8 mm. long, without connective gland; *style* stouter than filaments and as long as the longest of them; *ovary* 2-celled.

Fruit in life green with 4 sharp vertical ridges and smaller blunt irregular ridges between them, globose when dry, c. 1–1·25 cm. diam., blackish brown to reddish brown, smooth except for about 4 sharply raised vertical lines from apex to base, apex crowned by the persistent calyx lobes; boiled up fruits c. 1·5 cm. diam., with rather obscure vertical ridges, surface wrinkled between them; pericarp very thin and leathery, testa thick, crustaceous, adhering to cotyledons; seed 1, cotyledons minutely gland dotted, side by side, one about one-third larger than the other, inner faces nearly plane, attached to the hypocotyle near the periphery by short broad stalks.

Allied to *E. linocieroidea* as Ridley points out, but differing in the broader leaves with rather more distinct venation, the larger flowers with much longer stamens, and in the different fruit.

83. **Eugenia quadribracteata** Henderson in Gardens' Bulletin, Singapore, XI, 320, fig. 11 (1947). (Fig. 34*a*).

PENANG: Waterfall, *Curtis s.n.*, undated.
JOHORE: Kota Tinggi-Mawai road, frequent in drier parts of swampy forest, *SFN 30986* (*Corner*).
PERAK: Upper Perak, 1,000 feet, *Wray 3771*, two sheets in Herb. Calcutta which may represent fruiting material of this species.

A *tree* c. 20 m. tall; *twigs* stout, terete, bark smooth or creviced or slightly flaky, brown or greyish brown. *Leaves* generally oblong elliptic, occasionally tending to be ovate, up to c. 25 cm. long and 10 cm. broad, but generally rather smaller, apex shortly bluntly acuminate or acute, base shortly narrowed and decurrent on petiole; petiole stout, c. 1–1·3 cm. long; *primary nerves* very numerous and close together, hardly distinguishable from secondaries, up to about 60 pairs, fine but distinctly elevate on both surfaces; intramarginal nerve as distinct as primaries, c. 2–3 mm. from the revolute leaf margin; both surfaces densely and minutely punctate.

Inflorescences terminal or occasionally axillary, sometimes fasciculate, axis and branches as stout as or stouter than twigs, rounded or compressed or angled, up to c. 9 cm.

long, branches distant and short, usually horizontal or somewhat decurved; *flowers* sessile, densely crowded in heads at the branch ends, each flower subtended by 4 broad, triangular, more or less persistent, blunt bracteoles; *calyx* more or less globose in bud, obconic after anthesis, c. 3–4 mm. long and 4–5 mm. across mouth, lobes 5, broadly and shallowly triangular, rounded or somewhat acute; *petals* calyptrate; *stamens* c. 5–6 mm. long, *style* about the same length. Immature *fruit* globular or somewhat depressed globular, 5–6 mm. diam., crowned by the calyx rim.

This species is a distinct one in its large closely veined leaves and the stout inflorescence with the conspicuously bracteolate flowers in heads.

84. **Eugenia cyrtophylloides** Ridl. in Journ. Roy. As. Soc. Str. Br., LXXIX, 65 (1918); F.M.P., I, 749. (Fig. 31*d*).

PAHANG: Wray's Camp, Tahan, *Ridley 16274*, type collection. Known only from this collection. Perhaps allied to *E. cerina*, but not greatly resembling it.

A *tree* with pale reddish bark (fide Ridley)· *Twigs* terete with pale bark. *Leaves* lanceolate, acuminate, base long narrowed, decurrent on petiole, up to c. 8 cm. long and 2·5 cm. broad, petiole 3–5 mm. long; midrib channelled above, boldly raised below and more or less keeled; *primary nerves* c. 30 pairs, raised above and very slender, slightly raised below and very inconspicuous, meeting in a faint intramarginal nerve usually hidden by the revolute leaf margin; secondaries and reticulations hardly less distinct than primaries; upper surface usually more or less polished, drying greenish, lower surface dull, greenish brown with black gland dots.

Panicles terminal, up to c. 7 cm. long and 4 cm. wide, usually with a pair of branches c. 3–4 cm. long from near the base and two or three shorter pairs higher up the rachis, the branches not very stout, ascending, compressed or 4-angled, with striate bark; *flowers* in groups of threes at the ends of the short ultimate branchlets, sessile or very shortly pedicelled, *calyx* tube c. 3–4 mm. long, gradually narrowed to a very short stout pseudostalk, the tube funnel shaped in the open flower; lobes 4, triangular ovate, quite distinct; *petals* 4, falling as a calyptra but separable, rather thick, gland dotted, unequal, the two larger broadly ovate rounded, c. 1·5 mm. across, the two smaller ones narrower. *Stamens* rather numerous (more than 20), c. 1·5 mm. long, filaments broad, anthers oblong, connective gland visible; *style* short. *Fruit* unknown.

85. **Eugenia cerina** Henderson in Gardens' Bulletin, Singapore, XI, 322, fig. 12 (1947). *E. punctulata* King, Mat. F.M.P., No. 12, 122 (1901); Ridl., F.M.P., I, 747; Corner, Wayside Trees of Malaya, p. 502; non F.M. Bailey (1896). *Syzygium incarnatum* Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 195 (1939), non Eugenia incarnata Elm. (Fig. 31*e*).

Common in the lowlands from Penang to Singapore, often in swampy forest and near rivers.
Distrib: Sumatra, Borneo.

A *tree* up to c. 27 m. tall, fluted at base, or buttressed, the buttresses sometimes up to c. 1·5 m., or cylindric, or with a few stilt roots; bark reddish or reddish orange, rugose in older trees, more or less papery flaky, a thin green layer below surface, then a buff or yellowish fibrous brittle inner layer; wood hard, pale buff. *Twigs* terete or the youngest somewhat compressed, bark brownish, thinly papery flaky. *Leaves* coriaceous, obovate, oblanceolate or occasionally oblong, apex rounded, retuse, or with a short blunt point, or abruptly acuminate with acute or blunt acumen, narrowed at base gradually or abruptly, 2·5–11 cm. × 1·5–5 cm.; both surfaces drying olivaceous or pale brown to dark brown or reddish brown, the lower usually paler; midrib depressed above, elevate and keeled below; *primary nerves* usually about 16 pairs but often more, not conspicuous above, more or less raised below, faint and not easily distinguishable from secondaries, meeting in a slender intramarginal nerve close to the recurved leaf margin; secondaries and reticulations obscure or faint above, sometimes invisible below; sometimes almost as conspicuous as primaries; petiole 0·5–1 cm. long.

Panicles terminal or occasionally from the upper axils, lax, up to c. 12 cm. long, branches spreading, compressed, pale brown or brownish grey when dry; *flowers* small, sessile, crowded at the ends of the short ultimate branchlets, bracts and bracteoles very small and inconspicuous; buds obovoid, c. 2·75–3·25 mm. long; *calyx* campanulate or obconic, c. 2·25–2·5 mm. long and 2 mm. across mouth, narrowed to a very short stout pseudostalk c. 0·5 mm. long, mouth very obscurely and shallowly 4-toothed; *petals* calyptrate; *stamens* c. 15–30, filaments 0·5–0·75 mm. long, broad and flattened, tapering slightly from base to apex, anthers small, oblong, connective gland small and inconspicuous; style c. 0·5 mm. long, narrowly conical; *ovary* 2-celled.

Fruit oblong obovoid, 1·2–1·4 cm. long and 7–8 mm. across at widest point, apex flattened, deeply and narrowly excavate, with very short calyx rim; pericarp fleshy, 3–4 mm. thick; seed more or less globose, c. 4 mm. diam., testa adhering to it but peeling off easily, leaving a thicker inner layer, beneath which is a mucilaginous coat; cotyledons more or less equal, opposing faces folded, with the large hypocotyle, which is grooved along one side, lying in the fold and extending to the periphery of the seed.

This species was described as *E. punctulata* by King, Mat. F.M.P., No. 12, 122 (1901), and Ridley, F.M.P., I, 747 followed King without comment. King's name is a later homonym, being antedated by *E. punctulata* F. M. Bailey (1896). If this were all, only a new name would be required, but the case is complicated because King cited as a synonym *Jambosa "punctulata"* Miq., Fl. Ind. Bat. Suppl. I, 310, which may perhaps be taken as a typographical error for *Jambosa puncticulata*, the only name on p. 310 of Miquel's work that could be meant. King saw Miquel's plant, for he has written on a sheet of *Teysmann 3603* in Herb. Calcutta "This is the type sheet" and on the cover enclosing the sheet "Eugenia puncticulata Miq." *Jambosa puncticulata* Miq. is not our plant. It differs considerably in the leaves, which are oblong lanceolate, acuminate, with bold, well spaced primary nerves, raised below and impressed above. King's *E. punctulata*, therefore, must be regarded as a *mixtum compositum*. A further, though less important complication, is the fact that King omitted Sumatra, the type locality of Miquel's plant, from the distribution of his *E. punctulata.*

King probably took his specific name from *Syzygium punctulatum* Wall., which he also cited as a synonym, but which, being a *nomen nudum*, has no standing; but it might be argued that *Jambosa puncticulata* Miq. is the basinym, from which King's species must be interpreted, in spite of the fact that what King did describe is a totally different plant. King did not make the transfer of Miquel's name to Eugenia, and, as far as I can discover, it never has been transferred. It might be said that King's epithet "punctulata" could be a typographical error for "puncticulata" in the same way as his citation of Miquel's plant is probably such an error, but with Wallich's name "punctulata" available, the supposition does not seem warranted. The epithet "puncticulata" is not now available in Eugenia for Merrill gave it to a Philippine plant in 1914.

It was therefore thought advisable to start afresh and instead of giving merely a new name to King's plant, to re-describe the species and to indicate a type.

Merrill in Herb. Kew, and with Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 195 (1939) identifies this species with *E. incarnata* Elmer, Leaflets Philipp. Bot., IV, 1416 (1912), of which fruiting specimens only are known from Palawan, Philippine Islands, from an altitude of about 225 m. I have examined type material of *E. incarnata* (*Elmer 13231*) and although in leaf characters it closely approaches our plant, it differs in having smooth not flaky bark on the twigs, and in its globose much wrinkled fruits which differ rather markedly from the obovoid hardly wrinkled fruits of the Malayan plant. There are other points in Elmer's description which do not fit our plant, one being the colour of the fruits, which are said to be "of a pretty waxy or incarnatus red" and to give the tree a red appearance. Our plant has white or greenish white fruits with no red colour. *E. incarnata* is doubtless allied to *E.cerina*, perhaps closely, but in view of the scanty material available of the former, and of the differences between the two, it seems unwise to assume that they are the same.

E. cerina Henderson var. **turbinata** var. nov.

A typa foliis vulgo minoribus, nervis lateralibus pluribus, subtus plus prominentibus, pseudostipitis calycis longioribus, fructo turbinato differt.

SELANGOR: Sungai Tinggi, *Forest Dept. FMS 41652, 44060.*
NEGRI SEMBILAN: Singkang, *Forest Dept. FMS 4208.*
PAHANG: Pekan, *Ridley s.n.;* Baloh Forest Reserve, Kuantan, *Forest Dept. FMS 3615;* Sungai Chini, Kuantan, *Forest Dept. FMS 4106;* Rompin, *Forest Dept. FMS 17168;* Sungai Bera, near Tasek Bera, *SFN 24114* (*Henderson*); Tasek Bera, *SFN 24448* (*Henderson*).
JOHORE: Kota Tinggi, *Ridley 15374,* TYPE collection, holotype in Herb. Singapore; Bagan Limau, Sungai Sedili, *SFN 23897* (*Corner*); Danau, Sungai Sedili, *Corner s.n.*
SINGAPORE: Sungai Morai, *Ridley 3983 bis;* Sungai Jurong, *Ridley 4988;* Kranji, *Ridley 4989;* Bukit Mandai, *Ridley 6527;* Tampenis, *SFN 7616* (*Burkill*).

This variety usually has smaller leaves than the typical form, with nerves more numerous and more conspicuous below, but these characters are rather variable; the flower buds are more slender (c. 4–4·5 mm. long), the calyx c. 4 mm. long and 2–2·5 across mouth, tapering more gradually, the teeth a little more evident, the stamen filaments a little narrower and not flattened, the style a little shorter. The petals are calyptrate and the ovary 2-locular as in the typical form. The chief difference is in the fruit, which in this variety is turbinate, the apex expanded then abruptly contracted into a swollen stalk which often has a slight kink on one side, c. 1·5 cm. long and 7–8 mm. across the widest part of apex; pericarp fleshy with a fibrous endocarp; seed dark brown, oblong, 6–7 mm. long and 4 mm. across, testa adhering to cotyledons closely, consisting of an outer fine transparent coat and an inner, thicker, dark brown layer, but without the mucilaginous layer of the typical form; cotyledons more or less as in the typical form, but the hypocotyle not grooved.

E. cerina Henderson var. **montana** var. nov.

A typa floribus maioribus, lobis calycis conspicuis differt.

TRENGGANU: Gunong Padang, 4,000 feet, *SFN 31883* (*Moysey & Kiah*).
PERAK: Lower Camp, Gunong Batu Puteh, *Wray 1125.*
PAHANG: Fraser Hill, 4,000 feet, *SFN 33208*, TYPE collection, holotype in Herb. Singapore, *SFN 11264* (*Nur*), *Forest Dept. FMS 22537;* Cameron Highlands, *Forest Dept. FMS 25920.*
JOHORE: Gunong Belumut, summit, *Holttum 58* (leaf specimens only).

This variety differs from the typical form in the larger and stouter flower buds, 3·5–4 mm. long, the calyx c. 3–3·25 mm. long, c. 3 mm. wide just below lobes, narrowed rather abruptly into a short stout pseudostalk c. 1 mm. long, lobes evident, broad and rounded, incurved over petals in bud and persisting as triangular points after anthesis; petals calyptrate, but the calyptra much thicker than in the typical form or in var. *turbinata;* stamen filaments more tapered to apex. Ovary 2-celled. Fruit unknown. The bark is described by the collector of the type specimens as brownish greyish dull, slightly flaky, not fissured or rugose.

86. **Eugenia avenis** (Miq.) comb. nov. (Fig. 32*a*).

Syzygium avene Miq., Fl. Ind. Bat. Suppl. I, 312 (1860). *Syzygium scoparium* Wall. Cat. 3594, nom. nud. *Eugenia scoparia* Duthie in Hook. fil., F.B.I., II, 489 (1878); King, Mat. F.M.P., No. 12, 125; Ridl., F.M.P., I, 748.

MALACCA: Merlimau, *Goodenough 1649.*
JOHORE: Hadji Senawi, *Ridley 11055.*
SINGAPORE: sine loc., *Wallich 3594.*
Distrib: Sumatra.

A *? tree. Twigs* slender, terete, with a smooth polished papery pale yellow layer which flakes off and reveals pale reddish brown bark beneath. *Leaves* coriaceous, oblanceolate, narrowly obovate, or oblong- or elliptic-lanceolate, apex acute or shortly acuminate, base cuneate, up to c. 7 cm. × 2·5 cm., upper surface somewhat polished, drying brown to dark brown, minutely and closely punctate, lower surface dull and paler with close minute dark glands; midrib narrowly impressed above, elevate below; *primary nerves* numerous and close together, very slightly raised on both surfaces and almost invisible, meeting in a very obscure intramarginal nerve close to leaf margin; petiole usually less than 5 mm. long.

Panicles terminal or from upper axils, up to c. 4 cm. long, peduncle slender, 4-angled, usually long, with a few divaricate, short, slender, 4-angled, laxly flowered branches near its apex; *flowers* in threes at apices of short ultimate branchlets, the centre flower sessile, the outer ones on distinct pedicels c. 1 mm. long; buds clavate, c. 2·5–3 mm. long; *calyx* after anthesis rather widely funnel shaped, c. 2·5 mm. long, contracted rather abruptly at base into a pseudostalk c. 0·5 mm. long; lobes 4, short broad and rounded, incurved in bud, persistent; *petals* falling in a thick flat quadrangular calyptra; *stamens* few (c. 20), filaments short, subulate above, flattened at base, anthers elliptic, c. 0·2–0·3 mm. long.

Fruit more or less globular, c. 4 mm. diam., apex broad, convex, not excavate, with the very short calyx rim c. 2·5 mm. diam., and remains of calyx lobes.

King reduced *S. avene* Miq. to *E. scoparia* Duthie, but Wallich's name is a *nomen nudum* which was not validated, by Duthie, until 1878. Miquel's name is therefore older. I have compared a "duplicate type" of *S. avene* Miq. from Leiden and another sheet of the same collection (Sumatra, Priaman, *Diepenhorst H.B. 3083*) in Herb. Calcutta with a sheet of *Wallich 3594*, also in Herb. Calcutta. Although Wallich's specimen is in fruit and the others in flower, there can be little doubt that they are conspecific. The other collections cited above match the Sumatran plant reasonably closely.

E. avenis is probably allied to *E. cerina*, and also to *Syzygium nigropunctatum* Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 195, as these authors point out, but it differs from the latter in the narrower longer leaves and longer inflorescence branchlets.

87. **Eugenia Goodenovii** King, Mat. F.M.P., No. 12, 117 (1901); **emend.**; Ridl., F.M.P., I, 731, pro parte. (Fig. 32*b*).

PERAK: near Ulu Selangor, 500–700 feet, *Kunstler 8741*.
MALACCA: Ayer Kroh, *Goodenough 1759*, lectotype.
Distrib: Endemic.

A *tree*. Youngest *twigs* slender, compressed or 4-angled, older ones terete, bark smooth becoming slightly flaky, drying pale yellowish grey. *Leaves* thickly coriaceous, narrowly elliptic, apex shortly acuminate, base narrowly cuneate, up to c. 12 cm. × 4 cm., both surfaces drying brown, the upper somewhat polished, obscurely

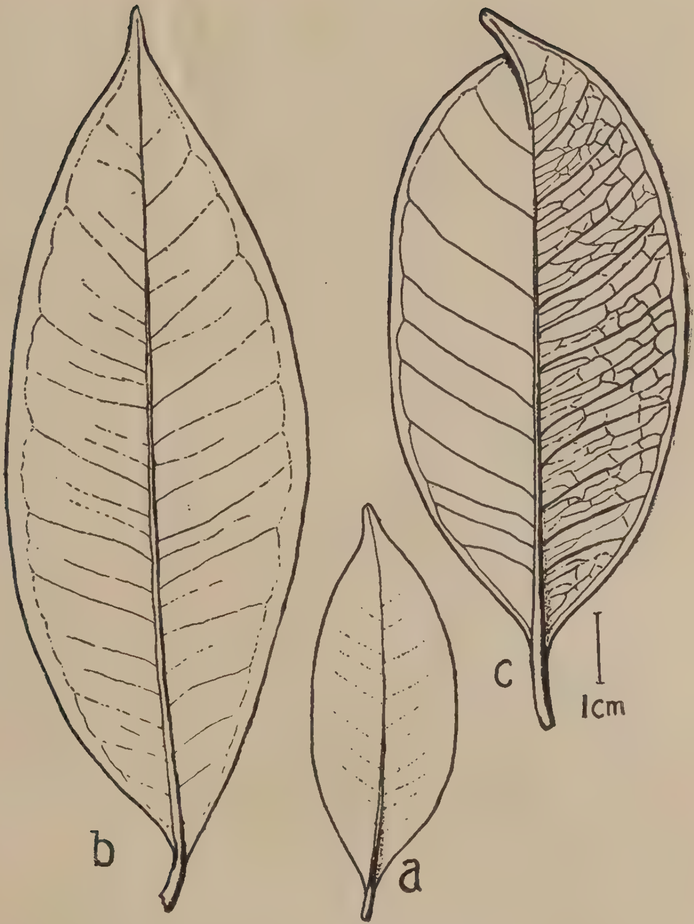

Fig. 32. a, *E. avenis;* b, *E. Goodenovii;* c, *E. Curtisii.*

punctate, the lower dull, not glandular; midrib shallowly impressed above, smooth and shining and elevate below; *primary nerves* about 12 pairs, c. 1 cm. apart, curving up to an intramarginal nerve c. 3 mm. from leaf margin, very obscure on both surfaces or invisible above; secondaries slightly fainter than primaries, reticulations not visible; petiole rather stout, channelled above, c. 5 mm. long.

Panicles terminal and from upper axils, short and rather densely flowered, c. 4 cm. long, usually branched from base, the branches short, spreading, angled, with brownish wrinkled bark, bracts and bracteoles small, broad and rounded, persistent; *flowers* usually in threes at branchlet ends, on pedicels c. 2 mm. long, or sometimes the central flower of the triads sessile; *calyx* nearly 1 cm. long, funnel shaped and tapered to base and rather suddenly contracted into a pseudostalk c. 1·5 mm. long; lobes 4, unequal, the two outer thick textured, broad and rounded, c. 3 mm. across and 2·5 mm. tall, the two inner rather thinner with thin margins, pellucidly gland dotted, c. 5 mm. across and 4·5 mm. tall; *petals* 4, falling as a calyptra, but not agglutinated and easily separable, orbicular, pellucidly gland dotted, c 6 mm. diam.; *stamens* numerous, anthers on oblong, c. 0·7 mm. long, connective gland inconspicuous; *ovary* 2-celled, multiovulate.

As noted under *E. rugosa* (Korth.) Merr., King's species is a mixture, for he included under it *Syzygium rigidum* Wall. Cat. 3581, which is *E. rugosa*, one of the clavate flowered group related to *E. attenuata*, and quite different from the specimens quoted above which have a funnel shaped calyx with conspicuous lobes. I have therefore retained King's name for the latter group, selecting *Goodenough 1759* as the type.

88. **Eugenia Curtisii** King, Mat. F.M.P., No. 12, 129 (1901); Ridl., F.M.P., I, 749. *E. coralina* Merr. in Journ. Roy. As Soc. Str. Br., LXXVII, 207 (1917); loc. cit., LXXIX, 20 (1918). *Syzygium Curtisii* (King), Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 182 (1939). (Fig. 32*c*).

PERAK: Sepatang, *Wray 2968* (syntype); Taiping *Wray 3102* (syntype); Gopeng, 300–500 feet, *Kunstler 6149* (syntype).
PAHANG: Sungai Bera near Tasek Bera, *SFN 24110* (*Henderson*).
JOHORE: Kangka Sedili Ketchil, *SFN 28622* (*Corner*).
Distrib: Sumatra, Borneo.

A *tree* up to c. 25 m. tall; trunk fluted at base; bark very slightly papery flaky, appearing smooth and entire, with persistent leaf scars, pinkish fawn to pale rufous fawn; inner bark pale fawn cinnamon darkening on exposure as does the yellowish wood. *Twigs* terete, bark drying dark brown, flaky. *Leaves* coriaceous, oblong elliptic or oblong lanceolate, occasionally oblanceolate, apex acuminate, base cuneate, from c. 5 cm. to 12 cm. long and 2 cm. to 5 cm. wide, upper surface drying greenish brown or olivaceous brown to nearly black, shining, obscurely punctate or glandular pustulate, lower surface dull and paler with minute close dark or concolorous pustulate glands; midrib narrowly impressed above, elevate and pustulate below; *primary nerves* up to 20 or 25 pairs, spreading and nearly straight, meeting in a nearly straight intramarginal nerve c. 2 mm. from the recurved leaf margin, usually raised on both surfaces, indistinct above, fine but distinct below, the secondaries and reticulations somewhat less distinct; petiole up to c. 1 cm. long.

Panicles terminal, occasionally from upper leaf axils, branched from the base, dense, corymbose, rachis, branches and branchlets rather stout, with reddish brown rugose-granular bark flaking in small square pieces; *flowers* sessile, densely crowded at the ends of the ultimate branchlets, buds globose clavate or obovoid, 4–6 mm. long; *calyx* after anthesis funnel shaped or widely campanulate, granular, 4–5 mm. long and c. 3 mm. across mouth, contracted rather suddenly at base into a rather slender pseudostalk 1–2 mm. long; lobes 5, broadly triangular, c. 1 mm. across and 0·5 mm. tall, deciduous; *petals* 5, falling as a calyptra but easily separable, orbicular, conspicuously pellucidly gland dotted, the outer one c. 3 mm. diam., the inner ones slightly smaller; *stamens* numerous, reaching 8–9 mm. long, filaments slender, subulate, anthers ovate oblong to orbicular, c. 0·4 mm. long, connective gland distinct; *style* stouter than filaments, c. 7 mm. long; *ovary* 2-celled, multiovulate.

Fruit depressed globose to nearly reniform and flattened laterally, or globose, up to c. 1·8 cm. broad and 1 cm. tall, surface shining or dull red brown when dry, smooth or minutely rugulose or pitted, apex with tubular remains of calyx tube c. 1·5–2 mm. tall and 3 mm. diam.; pericarp leathery, c. 1 mm. thick; seed 1, conforming to shape of fruit, cotyledons without testa, nearly equal, attached to hypocotyle by short broad stalks.

E. Curtisii King var. **minor** King, Mat. F.M.P., No. 12, 129 (1901).

PERAK: Tapah, *Wray 194* (syntype).
MALACCA: sine loc., *Harvey s.n.* (syntype).
PAHANG: Bentong, *Forest Dept. FMS 3912;* Rompin, *Forest Dept. FMS 17104.*

This differs from the type in having the inflorescence branches dark red rugose scurfy, not scaly flaky, the flowers either without pseudostalk or with a very short (c. 0·5 mm.) pseudostalk, the buds smaller (c. 3 mm. long), the leaves a little more oblong, upper surface smooth, not pitted, occasionally slightly pustulate, lower surface pustulate.

E. Curtisii King var. **Holttumii** (Ridl.) var. nov.

E. Holttumii Ridl. in Journ. Bot., 296 (1924); F.M.P., V, Suppl., 309.

PAHANG: Fraser Hill, 4,000–4,370 feet, *Forest Dept. FMS 7751* (*Burkill & Holttum*); Boh Plantations, Cameron Highlands, 4,000 feet, *SFN 32666* (*Nur*).

Although *E. Curtisii* is not a well-known or common species, there is sufficient variability in the collections to justify the inclusion of *E. Holttumii* as a mountain variety.

The variety differs from the typical form in the generally smaller leaves (2–7 cm. × 1–1·25 cm.) somewhat more closely nerved, the more abrupt contraction of the calyx into a very short (0·5 mm.) pseudostalk (the flowers are sessile, not pedicelled as Ridley described them) and the very small calyx lobes produced into subulate points.

89. **Eugenia setosa** King, Mat. F.M.P., No. 12, 120 (1901); Ridl., F.M.P., I, 755. (Fig. 33*a*).

PERAK: Taiping, *Wray 2704* (syntype); Larut, within 100 feet, *Kunstler 5447, 6202, 6601* (syntype), within 300 feet, *Kunstler 5266, 6793* (syntypes).
SELANGOR: Sungai Tinggi, Kuala Selangor, *SFN 34068* (*Nur*), *Forest Dept. FMS 44033*.
Distrib: Endemic.

A *shrub* or small *tree* or ? a climber. *Twigs* slender, terete, densely reddish scurfy and coarsely hairy with spreading subulate hairs. *Leaves* thinly coriaceous, oblong lanceolate or narrowly oblong, apex abruptly acuminate or caudate acuminate, the acumen up to c. 1·5 cm. long, base rounded, up to c. 8 cm. × 2·75 cm., upper surface somewhat polished, drying greenish or olivaceous brown, minutely punctate or pustulate, lower surface greenish brown to dark brown, minutely and closely pustulate; midrib narrowly impressed above, elevate below and clothed with coarse subulate spreading hairs; *primary nerves* numerous (up to c. 35 pairs) and close together, subhorizontal, meeting an intramarginal nerve less than 1 mm. from the somewhat undulate and recurved leaf margin, slightly raised and very fine and faint on both surfaces, the secondaries and lax reticulations hardly visible above, slightly fainter below than primaries; petiole very short, 2–3 mm., leaves appearing sessile.

Panicles terminal or from upper leaf axils, up to c. 8 cm. long, on long peduncles, branches numerous, slender, spreading, all covered with the same reddish scurf and coarse hairs as twigs; *flowers* rather crowded on the short ultimate branchlets, white, sessile, bracts and bracteoles minute, narrowly triangular acute, subpersistent, buds globose clavate; *calyx* campanulate, c. 5 mm. long and 3 mm.

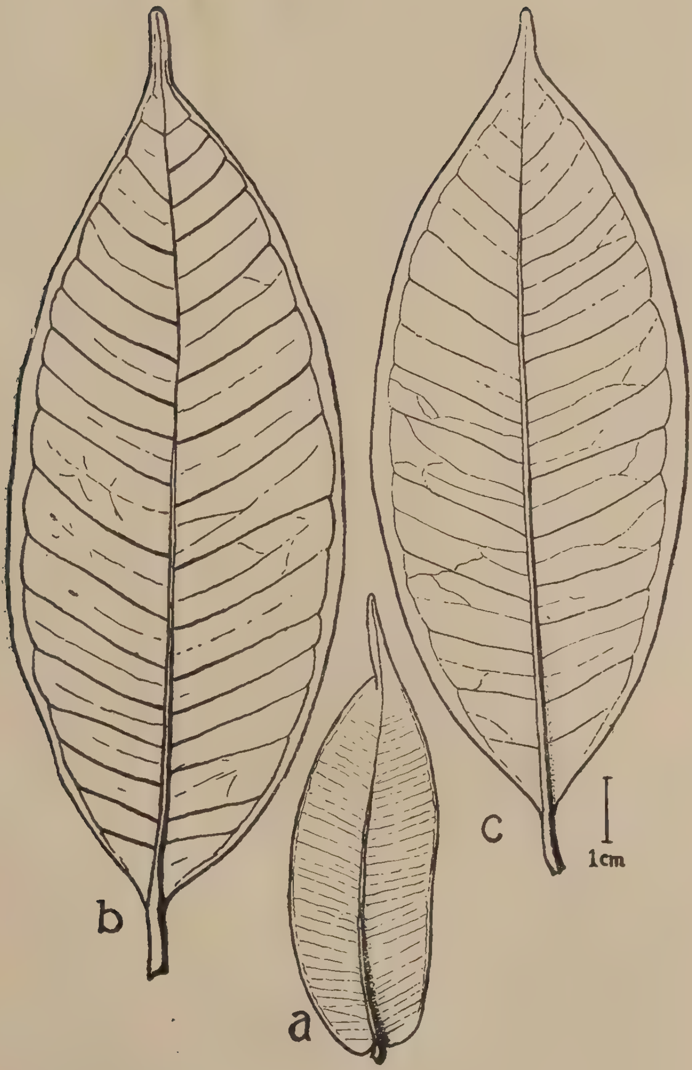

Fig. 33. a, *E. setosa;* b, *E. pauper;* c, *E. Klossii.*

across mouth, contracted about the middle into a rather slender pseudostalk c. 2 mm. long; lobes 5, deciduous, broadly triangular acute, less than 1 mm. across and 0·5 mm. tall; *petals* 5, probably falling as a calyptra, but the outer two free, orbicular, c. 2 mm. diam., pellucidly gland dotted, the inner three partially agglutinated; *stamens* numerous, filaments slender, subulate, up to c. 4 mm. long, anthers narrowly ovate, c. 0·4 mm. long, connective gland small but distinct; *style* stouter than filaments, glandular pustulate, c. 6 mm. long; *ovary* 2-celled.

Fruit turbinate, crowned by the small truncate calyx rim, covered with minute pellucid granule-like glands, diam. c. 9 mm. (ex King).

This species is allied to *E. Curtisii* var. *minor* and var. *Holttumii*, but it differs markedly in the rounded base of the leaf, the scurfy and coarsely hairy twigs and inflorescence branches, the different calyx lobes and the longer pseudostalk.

Several of Kunstler's collections are described on their labels as "creepers" clinging to stems of trees. The other collections cited, where a field note was made, are described as shrubs or small trees. If Kunstler made a mistake, it is curious that he did so more than once.

90. **Eugenia pauper** Ridl. in Journ. Roy. As. Soc. Str. Br., LXXIX, 65 (1918); F.M.P., I, 745. (Fig. 33*b*).

NEGRI SEMBILAN: Gemas, *SFN 4481* (*Burkill*).
JOHORE: Gunong Pulai, *Ridley 12175* (syntype); Gunong Panti, *Ridley 4200* (syntype), cited by King under *E. pendens* Duthie; Sungai Tebrau, *Ridley 13219;* Mount Austin, *Ridley 11992;* Pulau Tinggi, *SFN 939* (*Burkill*); Sungai Pelepah, *SFN 20005* (*Nur*); Sungai Berassau, Mawai-Jemaluang road, *SFN 28978* (*Corner*); Ulu Segun, Gunong Panti, *SFN 30697* (*Corner*).
SINGAPORE: Serangoon road, *Ridley 8411, 8412;* Bukit Timah, *Ridley s.n., 8449* (cited by King under *E. variolosa* King), *14136;* Botanic Gardens, *Ridley 6915, 6915a, 8944;* Reservoir Jungle, *SFN 32529* (*Corner*).
Distrib: Endemic.

A small *tree* or *treelet* up to c. 7 m. tall, trunk slightly stilted at base; bark slightly papery flaky, pale rufous; inner bark pallid brownish, green below surface, very thin. *Twigs* slender, terete, bark reddish brown. *Leaves* thin, dark green in life and pale beneath, broadly or narrowly elliptic, occasionally elliptic oblong, up to c. 18 cm. long and 7 cm. broad but usually smaller, apex cuspidate, the acumen varying much in length; base cuneate; *petiole* finely wrinkled, deeply and narrowly channelled above, variable in length from c. 5 cm. to 1·5 cm.; *primary nerves* usually between 10 and 16 pairs, finely impressed above, raised below and very distinct, from 6 mm. to 2 cm. apart, curving very gently or running nearly straight to a well marked intramarginal nerve 2–5 mm. from leaf margin; secondaries and reticulations obscure or invisible above, when visible slightly raised, slender and raised below, much less bold than primaries; upper surface usually drying dark or blackish brown, sometimes minutely and densely punctate; lower surface paler, brown, usually minutely pustulate or black dotted.

Inflorescences terminal or axillary, short, reaching 2 cm. long but usually less, rather dense, branchlets slender, dark coloured with sessile flowers in threes or more at their apices, bracts and bracteoles minute, subpersistent; *calyx* tube cupshaped, c. 5–6 mm. long, narrowed abruptly into a rather slender pseudostalk c. 2·5 mm. long, mouth of calyx truncate; *petals* falling in a calyptra c. 4 mm. diam., gland dotted, the petals closely adhering and usually only the outer one separable from the others; *stamens* numerous, filaments slender, terete, varying much in length from 1·5 mm. to c. 6 mm., anthers small with a rather conspicuous dark coloured connective gland; *style* much stouter than filaments, subulate, 8–9 mm. long.

Fruit globose c. 1 cm. diam., the apical calyx rim rather prominent, c. 1 mm. tall and 2 mm. diam.

I can hardly agree with Ridley's remark in the original description that the inflorescence of this species exactly resembles that of *E. oblata* Roxb. *E. oblata* has very much larger, usually terminal inflorescences, while its flowers are also larger with very definite calyx lobes.

91. **Eugenia Klossii** Ridl. in Journ. Roy. As. Soc. Str. Br., LXXIX, 65 (1918); F.M.P., I, 744. (Fig. 33*c*).

SELANGOR: Rantau Panjang, *Kloss 25* (type collection).
Distrib: Endemic.

A *tree*. *Twigs* slender, the youngest angled, the older terete, bark dark. *Leaves* thinly coriaceous, narrowly elliptic or oblong elliptic, apex acuminate acute, base cuneate, c. 14 cm. long and 6 cm. wide; midrib impressed above, elevate below; *primary nerves* 15–20 pairs, 5–7 mm. apart, meeting a shallowly looped intramarginal nerve c. 2–3 mm. from leaf margin, indistinct above, elevate below; petiole up to c. 7 mm. long.

Panicles terminal, up to c. 6 cm. long, lax and few flowered, the rachis and few spreading branches slender; *flowers* solitary or in twos or threes at branchlet ends; *calyx* broadly campanulate, c. 6–7 mm. long, 4–5 mm. across mouth, rather quickly contracted into a slender pseudostalk 3–4 mm. long, mouth truncate; *petals* calyptrate; *stamens* numerous, up to c. 1 cm. long, *style* about as long.

Known only from one collection. Perhaps allied to *E. pendens,* but with much smaller flowers. Merrill and Perry state that the Bornean record of this species is based on an erroneous determination.

92. **Eugenia valdevenosa** Duthie in Hook. fil., F.B.I., II, 489 (1878); King, Mat. F.M.P., No. 12, 111; Ridl., F.M.P., I, 743; Corner, Wayside Trees of Malaya, p. 504, fig. 168. *Syzygium valdevenosum* (Duthie) Merr. & Perry in Mem. Amer. Arts & Sci., XVIII, 3, 182 (1939). *Eugenia alata* Ridl. in Journ. Roy. As. Soc. Str. Br., LXXXVI, 293 (1922); F.M.P., I, 743. (Fig. 34*b*).

Common from Penang to Johore in lowland and hill forest, and in wet forest in Johore. One collection from a sapling at Bukit Timah, Singapore may be this species.
Distrib: Sumatra (*Krukoff 4390, 4406*), Borneo.

A *tree,* trunk not buttressed; bark entire or very faintly and shortly creviced or very finely fissured longitudinally, not flaky, pale greyish drab or greyish yellowish, very faintly pinkish; inner bark deep pink brown to red brown or blood red; sapwood white, heartwood pinkish brown, very hard. *Twigs* rather stout, obtusely 4-angled or nearly terete, or acutely 4-angled with narrow wings, bark smooth, brown when dry. *Leaves* coriaceous, elliptic or oblong elliptic, sometimes obovate, apex shortly and abruptly acuminate, base cuneate or sometimes rounded, from c. 11–28 cm. long and 5–11 cm. wide, upper surface drying olivaceous brown to blackish brown, lower surface reddish brown with or without minute scattered gland dots; midrib impressed above, prominent below; *primary nerves* from c. 10–24 pairs, 1–2 cm. apart, slightly raised and rather fine above, prominent below, basal ones nearly straight and slightly ascending, upper ones curving up to a prominent intramarginal nerve 3–5 mm. from leaf margin, with a much fainter series of loops close to the margin; secondaries and reticulations slightly raised and very fine above, elevate below but considerably less prominent than primaries, the reticulations lax; petiole up to c. 1·5 long, rather slender.

Panicles terminal or from upper leaf axils, pedunculate, usually shorter than leaves but reaching c. 25 cm. long in fruit, often clustered, rather lax, with many spreading, slender, much compressed branches; *flowers* white, sessile, in threes or clusters at the ends of the rather long and slender ultimate branchlets, buds narrowly clavate, 8–9 mm. long; *calyx* rather narrowly funnel shaped, tapered rather gradually into a slender pseudostalk c. 3–4 mm. long, mouth truncate, without lobes, c. 2·5 mm. across; *petals* falling as a hemispherical calyptra c. 2·5 mm. diam., not completely

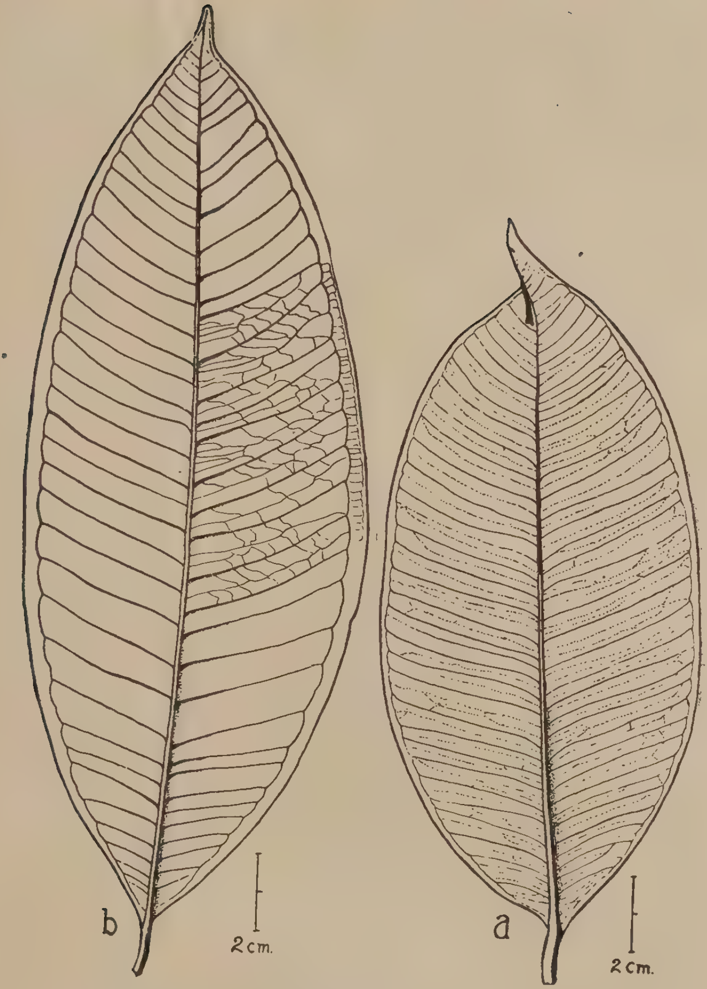

Fig. 34. a, *E. quadribracteata;* b, *E. valdevenosa.*

agglutinated; *stamens* numerous, filaments very slender, up to c. 1·3 cm. long, anthers broadly elliptic, c. 0·4 mm. long, connective gland small; *style* much stouter than filaments, 6–7 long; *ovary* 2-celled.

Fruit ripening pale green or whitish, more or less oblong globose or depressed globose, c. 1·8 cm. diam., apical umbilicus 3–4 mm. diam., rather deep, with persistent style base, the calyx rim not conspicuous; pericarp 2–3 mm. thick, testa adhering loosely to it; cotyledons more or less equal, surface rugose, inner faces somewhat concave, attached to hypocotyle near their centres by very broad short stalks.

93. **Eugenia Cumini** (L.) Druce in Report. Bot. Exch. Club Brit. Isles, III, 418 (1914); Craib, Fl. Siam. Enum., I, 637; Corner, Wayside Trees of Malaya, p. 496, fig. 168. *Myrtus Cumini* Linn., Sp. Pl., 471 (1753). *Syzygium Cumini* (L.) Skeels in U.S. Dept. Agric. Bur. Pl. Ind. Bull., 248, 25 (1918); Merr. & Perry in Journ. Arn. Arb., XIX, 108. *Eugenia jambolana* Lamk., Encycl., III, 198 (1789); Duthie in Hook. fil., F.B.I., II, 499; King, Mat. F.M.P., No. 12, 131; Gagnep. in Fl. Gen. Indo-Ch., II, 818; Koord. & Valet., Atlas Baumart. Java, III, fig. 496; Ridl., F.M.P., I, 754. (Fig. 35).

A *tree* up to c. 20 m. tall; bark scaly with thin often transversely elongated large or small papery pieces, light greyish white, inner bark thick, pale brown. *Twigs* slender, terete, smooth, pale yellowish grey or whitish when dry. *Leaves* coriaceous, oblong ovate or elliptic oblong or ovate rotund, apex rather shortly and abruptly acuminate or obtuse or rounded, base broadly cuneate or rounded and abruptly and shortly narrowed to petiole, from c. 7–18 cm. long and 3–8·5 cm. broad, upper surface drying brown to blackish brown, shining, minutely punctate, lower surface dull and paler, minutely pitted or pustulate; midrib impressed above, elevate below; *primary nerves* rather numerous (to c. 30 pairs), usually about 5 mm. apart, rather irregular, meeting in an irregularly looped intramarginal nerve c. 2 mm. from leaf margin, raised on both surfaces and fine, but more distinct below, the secondaries and closely netted reticulations below almost as distinct as primaries and so giving the effect of numerous and close primaries; petioles slender, reaching 2·5 cm. long.

Panicles usually from twigs below leaves, occasionally terminal or from upper leaf axils, up to c. 12 cm. long, long peduncled with several pairs of distant horizontal slender terete or slightly angled striate branches; *flowers* white, the calyx rose pink after anthesis, sessile in rather dense heads at ends of branches or in clusters at ends of short branchlets, buds globose clavate, 5–6 mm. long; *calyx* with fine raised gland dots, 4–5 mm. long, c. 3·5 mm. across mouth, narrowly campanulate, rather suddenly contracted into a stout pseudostalk c. 2 mm. long; lobes in bud 4, broad, thin and obscure, quickly deciduous and leaving a truncate limb; *petals* falling in a flat, orbicular, gland dotted calyptra c. 2·5 mm. diam.; *stamens* numerous, filaments slender, subulate, very finely punctate, up to c. 6 mm. long, anthers oblong ovate 0·6–0·7 mm. long, connective gland

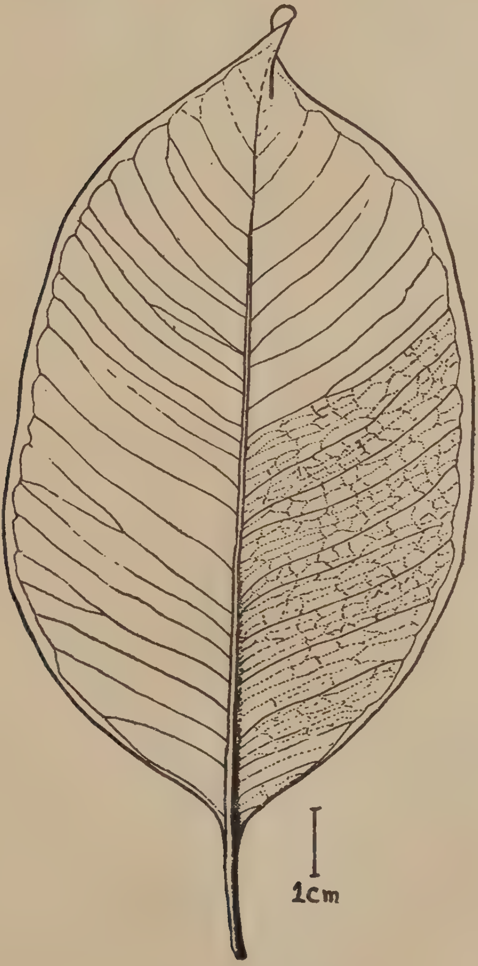

Fig. 35. *E. Cumini.*

small but distinct; *style* subulate, much stouter than filaments and finely punctate like them, 6–7 mm. long; *ovary* 1-celled, multiovulate.

Fruit black when ripe, edible, oblong to oblong elliptic, more or less oblique, c. 2 cm. × 1·75 cm., apical calyx rim prominent, c. 2 mm. tall, umbilicus narrow and deep, c. 2–3 mm. diam.; pericarp pulpy, c. 2–3 mm. thick, seed ellipsoid or oblong ellipsoid, c. 1·25 cm. × 0·75 cm., testa rather thick, more or less crustaceous, adhering closely to the smooth surface of the cotyledons; cotyledons unequal, one about one-third the size of the other, or nearly equal, conspicuously gland dotted, superposed, sessile, attached to the short broad hypocotyle near the periphery, face of the larger cotyledon concave, of the smaller convex, not interlocking or folded, or nearly plane with a short upcurved fold near point of attachment.

There is no evidence to show that this species is indigenous to the flora of Malaya. It has been collected only in the vicinity of towns and villages.

94. **Eugenia oblongifolia** Duthie in Hook. fil., F.B.I., II, 491 (1878); King, Mat. F.M.P., No. 12, 111, incl. var. *parviflora* King, excl. var. *robusta* King; Ridl., F.M.P., I, 744. (Fig. 36*a*).

PERAK: Gopeng, 500–800 feet, *Kunstler 6012;* near Ulu Kerling, 500–800 feet, *Kunstler 8848;* near Ulu Selangor (? or Slim), 400–600 feet, *Kunstler 10883;* Gunong Haram Parah, *Scortechini 618.*
MALACCA: sine loc., *Maingay K.D. 746* (type collection), *Ridley 1503c, 1505c.*
NEGRI SEMBILAN: Telok Kemang, *Forest Dept. FMS 4210.*
SINGAPORE: Chan Chu Kang, *Ridley 360, 4993;* Gardens Jungle, *Ridley 10131;* McRitchie Reservoir, *Corner s.n.*
Distrib: Endemic.

A *tree* up to c. 18 m. tall; bark becoming slightly scaly, brownish pink, very like that of *E. longiflora;* inner bark red. *Twigs* rather slender, youngest 4-angled or compressed, older nearly terete, smooth, drying pale brown. *Leaves* thinly coriaceous, elliptic or oblong elliptic, sometimes oblong lanceolate or oblanceolate, apex acuminate, often abruptly so, base cuneate or more or less rounded and shortly narrowed to petiole, from c. 6–10 cm. long and 2·5–5 cm. broad; upper surface drying olivaceous brown, shining, lower brown to reddish brown; midrib impressed above, elevate below and more or less keeled; *primary nerves* c. 10–14 pairs, spaced, very slender, raised and distinct on both surfaces, often pale, spreading and rather irregular, meeting in a very shallowly looped intramarginal nerve 1–3 mm. from leaf margin; secondaries and reticulations raised on both surfaces and distinct, usually slightly less prominent than primaries; petiole c. 5 mm. long.

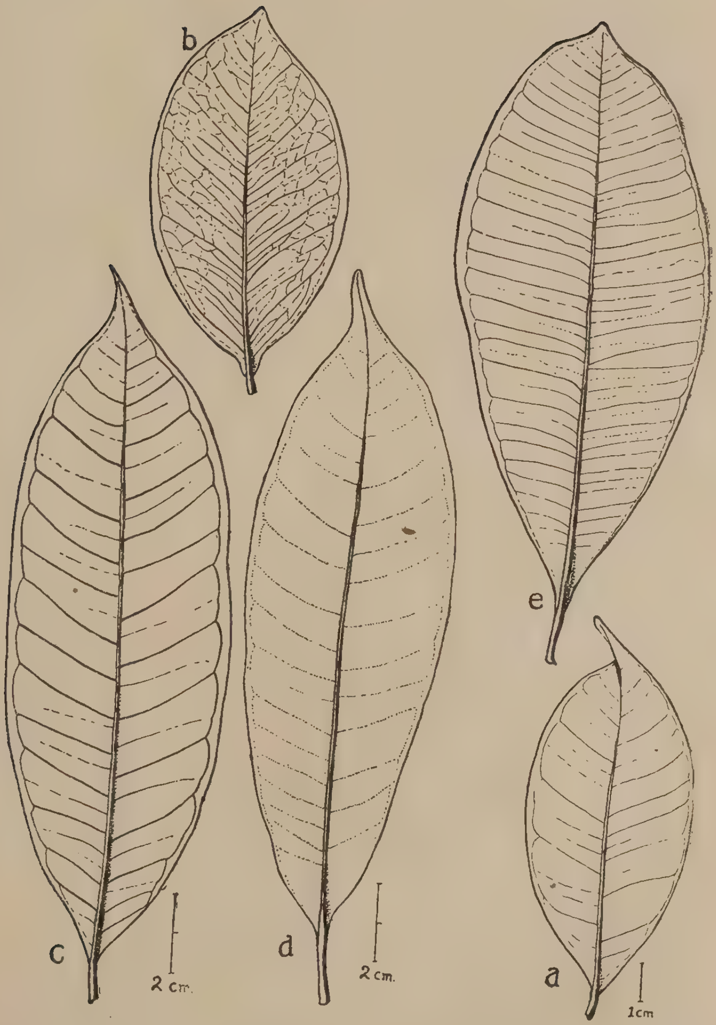
b
e
c
2 cm.
d
2 cm.
a
1cm

Fig. 36. a, *E. oblongifolia;* b, *E. Muelleri;* c, *E. pustulata;* d, *E. chloroleuca;* e, *E. fastigiata.*

Panicles terminal or from upper axils, corymbose, sometimes several together, peduncled, reaching c. 10 cm. long and as wide, the rather stout peduncle and rather slender numerous branches more or less 4-angled, the numerous branchlets slender, compressed, all with pale brown striate bark; *flowers* white or cream colour, sessile, usually in threes at branchlet ends; buds narrowly globose clavate, c. 7–8 mm. long; *calyx* c. 7 mm. long, c. 3 mm. across mouth, striate when dry, narrowly campanulate, tapering into a slender pseudostalk c. 4 mm. long, mouth in bud with 4 very shallow oblong obscure lobes, truncate after anthesis; *petals* falling in a depressed calyptra c. 2·5 mm. diam.; *stamens* numerous, filaments slender, up to c. 7 mm. long, anthers broadly oblong ovate, c. 0·3–0·4 mm. long, connective gland very small and inconspicuous; *style* stouter than filaments, 4–5 mm. long; *ovary* 2-celled.

Fruit depressed globose or transversely oblong globose, pale green when ripe, c. 1·7 cm. diam., apex with a narrow and rather deep excavation c. 3 mm. diam., fringed by the inconspicuous calyx rim; pericarp thin, seed 1, testa rather thick and crustaceous, adhering closely to cotyledons; cotyledons side by side, somewhat unequal, inner faces more or less concave, gland dotted, attached to hypocotyle near their centres by short broad stalks.

95. **Eugenia Muelleri** Miq., Anal. Bot. Ind., I, 23, tab. 6 (1850). *E. venulosa* Duthie in Hook. fil., F.B.I., II, 490 (1878); King, Mat. F.M.P., No. 12, 123, incl. var. *macrothyrsa* King; Ridl., F.M.P., I, 746; Corner, Wayside Trees of Malaya, p. 504, fig. 168. *Syzygium venulosum* Wall. Cat. 3585 nom. nud. *Syzygium Muelleri* Miq., Fl. Ind. Bat., I, i, 453 (1855); Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 186. (Fig. 36*b*).

Not uncommon from Perak to Singapore in lowland forest, commonest in South Johore and Singapore, often by streams. *Distrib.* Borneo; Karimon Islands (fide Ridley).

A *tree* reaching c. 22 m. tall, trunk narrowly fluted up to c. 2·4 m. from ground or only at base, slightly stilt rooted or not; bark nearly smooth, becoming rather finely creviced, flaky in irregular small pieces, light grey or greyish brown; inner bark light pinkish brown, wood pale brown. *Twigs* slender, terete, smooth, drying whitish to pale brown. *Leaves* coriaceous, elliptic or elliptic rhomboid or oblanceolate or obovate, apex obtuse or subacute, base cuneate or shortly and abruptly narrowed to petiole, from c. 5 cm. ×

3 cm. or occasionally smaller to c. 11·5 cm. × 5·5 cm., dark green to yellowish green, shining above, dull and paler below, upper surface drying olivaceous brown or leaden brown to nearly black, shining, minutely punctate or rugulose pustulate, lower surface paler, usually reddish brown, sometimes minutely pustulate; midrib shallowly depressed above, elevate and keeled below; *primary nerves* c. 7–14 pairs, c. 0·5–1 cm. apart, ascending rather irregularly to a nearly straight intramarginal nerve c. 2–3 mm. from leaf margin, raised and slender and distinct on both surfaces, the secondaries and lax reticulations also raised on both surfaces and a little less prominent than primaries; petiole about 5 mm. long, the leaf blade sometimes decurrent upon it.

Panicles terminal, broadly corymbose, peduncled or branched from base, up to c. 10 cm. long and 14 cm. across, often much smaller, much branched, the branches and branchlets slender, spreading, 4-angled, ultimate branchlets compressed; *flowers* white, the calyx greenish or tinged reddish, sessile in threes at ends of ultimate branchlets, buds clavate, up to 7 mm. long; *calyx* 5–6 mm. long, campanulate, rugulose and ridged, rather suddenly contracted into a pseudostalk rather variable in length and thickness but usually slender and c. 3–4 mm. long, mouth truncate or with very shallow and very obscure lobes; *petals* falling in a pellucidly gland dotted calyptra c. 3 mm. diam., almost entirely or entirely agglutinated; *stamens* numerous, filaments slender, subulate, reaching 7–8 mm. long, anthers ovate oblong, c. 0·4 mm. long, connective gland conspicuous; *style* much stouter than filaments, c. 7 mm. long; *ovary* 2-celled.

Fruit when ripe green, the exposed side suffused purple, globose, faintly vertically ridged, c. 1·3 cm. diam., apical umbilicus c. 4 mm. diam., without calyx rim; pericarp leathery, seed 1, testa pale brown, tough, cotyledons slightly unequal, inner faces gland dotted, nearly plane except for a triangular projection on the periphery of the smaller fitting into a recess on the other, attached near their centres to the hypocotyle by very short broad stalks; in one seed examined a small area of the opposing faces fused together.

I have not seen the type of *E. Muelleri* Miq., but Miquel's descriptions and figure fit our plant, and Merrill and Perry, the former of whom has examined the type, have no hesitation in making the reduction of Duthie's species.

96. **Eugenia pustulata** Duthie in Hook. fil., F.B.I., II, 495 (1878); King, Mat. F.M.P., No. 12, 127; Ridl., F.M.P., I, 736. *E. perpuncticulata* Merr. in Univ. Calif. Publ. Bot., XV, 220 (1929). *Syzygium perpuncticulatum* (Merr.) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 179 (1939). (Fig. 36*c*).

Widely distributed from Kedah to Singapore on the west of the Main Range, but nowhere frequent except in Singapore. *Distrib:* **Borneo.**

A small *tree*, bark nearly entire or finely creviced or pimply, flaking in coarse pieces, not papery flaky, pinkish brown to vinaceous brown; inner bark pinkish, darkening on exposure. *Twigs* terete, slender, the younger ones green in life, older ones pale brown, bark smooth, drying pale brown and pustulate. *Leaves* dark green and shining above, very obscurely punctate, paler and dull below with darker gland dots, coriaceous, oblong or oblong lanceolate, apex acuminate, base cuneate, from c. 8–22 cm. long and 3–6·5 cm. broad, upper surface drying greenish or brownish, lower surface brown, pustulate; midrib impressed above, prominent and rounded below, smooth in life, pustulate when dry; *primary nerves* c. 10–15 pairs, c. 0·5–1 cm. apart, impressed above, elevate and conspicuous below, slightly ascending and curving gently up to a conspicuous shallowly looped intramarginal nerve 3–4 mm. from leaf margin, with a very faint loop very close to the margin; secondaries few, less distinct than primaries, reticulations invisible above, lax and faint below; petiole up to c. 1 cm. long.

Panicles terminal or from upper leaf axils, sometimes clustered, shortly peduncled or sessile, c. 3–5 cm. long (or rarely up to c. 11 cm.) with several pairs of spreading decussate branches, the lower ones c. 2 cm. long, the upper shorter, they and the rachis stout, green, obtusely quadrangular and grooved in life, 4-angled or compressed with brownish pustulate bark when dry; *flowers* fragrant, greenish yellow with green calyx lobes, white petals and white or yellow stamens, sessile in threes or fives at branchlet ends, buds cylindric oblong, truncate, 6–7 mm. long; *calyx* after anthesis narrowly campanulate, c. 6 mm. long, the tube minutely rugulose and glandular punctate, very slightly narrowed and rounded at base, without pseudostalk; lobes 4, subpersistent, incurved, very short and broad, subacute, c. 3 mm. across at base and 1 mm. tall; *petals* falling in a flattened calyptra, but not agglutinated, ovate orbicular, c. 3 mm. diam.; *stamens* numerous, filaments subulate, from less than 1 mm. to c. 5 mm. long, anthers oblong elliptic, c. 0·4–0·5 mm. long, connective gland rather large; *style* stouter than filaments, terete, narrowly conical, c. 3 mm. long; *ovary* 2-celled, multiovulate.

Fruit very pale green to white, shining, oblong globose, c. 1·3 cm. long, minutely rugulose pustulate when dry, apical umbilicus rather deep, c. 5–6 mm. diam., fringed by the 4 erect, somewhat enlarged calyx lobes and bearing the style base; pericarp c. 3 mm. thick at base of fruit, rather dry and pithy, white, rapidly turning purplish on exposure; seed 1, globose, c. 6 mm. diam., testa rather thick, pithy leathery; surface of cotyledons very pale yellow, glistening, somewhat rugose corrugate; cotyledons side by side, nearly equal, inner faces very finely gland dotted, with a median ridge and furrow, attached near their centres to the large, conspicuous, pink, angled, truncate hypocotyle which is grooved along one side and reaches the periphery of the seed. Germination epigeal.

I have examined duplicates of *Elmer 21223* (type of *E. perpuncticulata* Merr.) and *Elmer 21237* and can see no differences between them and our plant, except for the slightly blunter calyx lobes of Merrill's plant.

97. **Eugenia chloroleuca** King, Mat., F.M.P., No. 12, 113 (1901); Ridl., F.M.P., I, 744. (Fig. 36*d*).

PERAK: Larut, 2,000 feet, *Kunstler* 1901 (syntype), 1,500–2,000 feet, *Kunstler 4951, 7307* (syntypes); Waterfall Hill, Taiping, *Wray 2917* (syntype); Taiping Hills, *Ridley 11920;* Tea Gardens, Larut, *Scortechini 45* (syntype).
JOHORE: Sungai Kayu Ara, Mawai-Jemaluang road, *Corner s.n.*
Distrib: Sumatra; Banguey Island (fide Ridley).

A *shrub* or small *tree*. *Twigs* slender, youngest 4-angled, older terete, bark polished, drying pale yellowish or brownish. *Leaves* coriaceous, oblanceolate, oblong lanceolate or elliptic lanceolate, apex acuminate, usually shortly and abruptly so, base long narrowed, from c. 6–17 cm. long and 2–5·5 cm. broad, upper surface shining, drying pale olivaceous or olivaceous brown, lower surface dull and paler, midrib impressed above, prominent and keeled below; *primary nerves* 12–16 pairs, very faint or invisible above, slightly raised below, very fine and faint, c. 0·5–1 cm. apart, spreading and curving slightly up to a very faint intramarginal nerve 2–3 mm. from the thickened and recurved leaf margin, secondaries and reticulations usually invisible on both surfaces; petiole slender, up to c. 1·5 cm. long.

Panicles usually terminal, occasionally axillary, up to c. 3 cm. long, shortly peduncled or branched from base, trichotomous, branches and branchlets acutely 4-angled with pale, wrinkled or striate bark when dry, bracts and bracteoles persistent, ovate concave subacute, c. 1 mm. long; *flowers* in threes on stout 4-angled pedicels c. 2 mm. long, each flower subtended by two bracteoles; *calyx* c. 3 mm.

long, funnel shaped, more or less 4-angled, gradually tapered to base, without pseudostalk; lobes 4, persistent, broad and rounded, sparsely gland dotted, c. 1·5 mm. across and 0·75 mm. tall; *petals* calyptrate; *stamens* numerous, filaments stout, terete, glandular pustulate, up to c. 4 mm. long, anthers ovate oblong, c. 0·6 mm. long, connective gland inconspicuous; *style* slightly stouter than filaments, c. 2·5 mm. long, glandular pustulate, slightly broadened and truncate at apex; *ovary* 2-celled, apparently sometimes 4–5 celled at apex.

Fruit ellipsoid, c. 1 cm. long, rugulose when dry and pale coloured, apex with conspicuous wide calyx rim 3 mm. diam., edged with the enlarged incurved calyx lobes; seed 1, obovoid ellipsoid, cotyledons side by side, equal, commissure wavy, inner faces interlocking with triangular ridges and depressions, hypocotyle large, lying in a fold in the cotyledon face and reaching nearly to periphery of seed.

Allied to *E. fastigiata* as King points out, but differing in the leaves drying paler, with fewer, more widely spaced primary nerves; shorter stouter petioles; shorter inflorescences; and the fruit drying rugulose eglandular, not smooth and glandular.

98. **Eugenia fastigiata** (Bl.) Koorders and Valeton in Meded. Lands Plantent., XL, 104 (1900); Atlas Baumart. Java, III, fig. 479. *Calyptranthus fastigiata* Bl., Bijdr., 1090 (1825). *Calyptranthus floribunda* Bl., loc. cit., 1091. *Caryophyllus fastigiatus* Bl. in DC., Prodr., III, 262. *C. floribundus* Bl. in DC., loc. cit., 262. *Eugenia bracteolata* Wight, Ill., II, 15 (1850); Duthie in Hook. fil., F.B.I., II, 488; King, Mat. F.M.P., No. 12, 122; Gagnep. in Fl. Gen. Indo-Ch., II, 815; Ridl., F.M.P., I, 747; Craib, Fl. Siam. Enum., I, 633. *E. Elmeri* Merr. in Univ. Calif. Publ. Bot., XV, 218 (1919). *E. confertiflora* Koord. & Valet. in Meded. Lands Plantent., XL., 106 (1900); Atlas Baumart. Java, III, fig. 480. *Syzygium fastigiatum* (Bl.) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 152 (1939). (Fig. 36*e*).

Not uncommon in lowland forest and sometimes on low hills from Perlis and Kelantan to Johore.
Distrib: Tenasserim, Sumatra, Borneo, Java.

A *tree* up to c. 25 m. tall; bark smooth entire, slightly pustulate with lenticels, pinkish grey to pale pinkish white; inner bark pale brownish, green below surface. *Twigs* acutely or obtusely 4-angled, bark smooth, polished, drying pale brown or yellowish brown. *Leaves* coriaceous, oblanceolate or oblong obovate, apex obtuse or shortly and bluntly acuminate or apiculate, base cuneate or long narrowed, up to c. 16 cm. × 6 cm., upper surface drying pale brown to almost black, shining, minutely punctate, lower surface dull and paler, often reddish brown, with scattered dark gland dots; midrib flat above or slightly raised and channelled, sometimes impressed towards apex of leaf, prominent and keeled below; *primary nerves* up to c. 30 pairs, 3–5 cm. apart, nearly horizontal or slightly ascending, running straight or slightly curving to an intramarginal nerve c. 1–2 mm. from the cartilaginous incurved leaf margin, usually very slightly raised and indistinct above, slightly raised below and very fine, usually distinct, the secondaries and reticulations less distinct and often hardly visible; petiole up to c. 1 cm. long.

Panicles terminal or occasionally from upper leaf axils, up to c. 15 cm. long, corymbose, rather densely flowered, pedunculate, branches slender and 4-angled and grooved like the peduncle, bracts and bracteoles persistent, ovate subacute, concave, gland dotted, c. 1 mm. long; *flowers* pale green or white, at apices of the many short 4-angled branchlets, on rather stout pedicels 1–2 mm. long, or occasionally sessile, each flower subtended by two bracteoles; *calyx* shortly and broadly funnel shaped, c. 3 mm. long and 2·5 mm. across mouth, tube 4-angled, tapered gradually to a broad base, without pseudostalk; lobes 4, persistent, broad and rounded, gland dotted, c. 1·5 mm. across and 0·5 mm. tall; *petals* falling in a thick hemispherical calyptra, pellucidly gland dotted, c. 2·5 mm. diam.; *stamens* numerous, filaments flattened and strap shaped below, subulate above, with scattered pustulate glands, up to c. 3 mm. long, anthers oblong ovate, c. 0·5 mm. long, the connective gland, which is often paired, conspicuous; *style* stout, c. 1·5 mm. long; *ovary* 2-celled.

Fruit (unripe) ellipsoid or oblong, c. 1 cm. long, closely glandular, apex convex bearing the 4 enlarged and incurved calyx lobes; seed 1, conforming to shape of fruit, cotyledons side by side, equal, inner faces conspicuously glandular, with triangular projections and depressions fitting into one another, the hypocotyle stout and angled, reaching the periphery of the seed.

Examination of authentic material of *E. fastigiata* from Buitenzorg, and of a duplicate type and other material of *E. Elmeri* Merr., as well as the type of *Calyptranthus floribunda* Bl., on which *E. confertiflora* Koord. & Valet. is based, leaves no doubt that they, and *E. bracteolata* Wight are all conspecific. These reductions have already been made by Merrill and Perry.

99. **Eugenia pallidula** Ridl., F.M.P., I. 748 (1922). (Fig. 37*a*, *b*).

PERAK: Pondok Tanjong Forest Reserve, *Forest Dept. FMS 9717.*
PAHANG: Rembau, Temerloh, *Forest Dept. FMS 4783* (type); Sungai Semara, Pontian, *Forest Dept. FMS 14976.*
Distrib: Endemic.

A *tree* (fide Ridley). *Twigs* terete, slender, bark whitey brown, smooth. *Leaves* thinly coriaceous, elliptic or obovate, up to c. 9 cm. long and 4·5 cm. broad, apex rounded or very shortly and bluntly acuminate or very shortly acute, base long narrowed to petiole; *petiole* variable, usually c. 5 mm. long; midrib conspicuously channelled above, boldly raised below; *primary nerves* c. 11–14 pairs, usually slightly impressed above and very faint, raised below, slender but quite distinct, irregular in spacing but usually 3–6 mm. apart, meeting in a rather inconspicuous, shallowly looped, intramarginal nerve c. 1 mm. from leaf margin; secondaries and reticulations almost or quite invisible above, raised below and much less distinct than primaries; upper surface drying lead brown or dark brown, minutely punctate, lower surface pale, or at least paler than upper, sometimes very minutely gland dotted.

Inflorescences terminal or from upper leaf axils, more or less paniculate, very lax, up to c. 7 cm. long, with few and widely spaced spreading slender branchlets; *flowers* in threes at ends of the secondary branchlets, or on very short tertiary branchlets, occasionally in pairs or solitary, sessile; *calyx* tube c. 6–7 mm. long, cupshaped and abruptly narrowed into a slender pseudostalk c. 3 mm. long, longitudinally ridged when dry, mouth with 4 wide shallow thin subpersistent lobes; *petals* falling in a calyptra, only partially separable, gland dotted; *stamens* variable in length, reaching c. 6·5 mm. long, filaments slender, terete, anthers small, connective gland not conspicuous; *style* much stouter than filaments, tapering to apex, c. 7 mm. long. *Fruit* unknown.

100. **Eugenia nemestrina** Henderson in Gardens' Bulletin, Singapore, XI, 324, fig. 13 (1947).

SINGAPORE: McRitchie Reservoir, *SFN 33590* (*Corner*); Selitar, near Nee Soon village, *SFN 37396* (*Corner*); Mandai road, *SFN 37252* (*Corner*).
Known only from Singapore.

A *tree* 25–30 m. tall, slightly or prominently buttressed-fluted to c. 2 m. from ground; bark rufous brown, fissured or distinctly scaly flaky, inner bark deep purple. *Twigs* stout, terete, with smooth pale brown bark becoming scaly flaky and red brown. *Leaves* decussate, narrowly elliptic to oblong elliptic, coriaceous, 6–11 cm. × 2–4·5 cm., dull green withering yellow, with upcurled margins and reflexed apex, drying pale brown to reddish brown above, dull pale brown to whitish brown below, apex acuminate and deflected sideways, base cuneate and long narrowed on to petiole; midrib sunk above, strongly raised and keeled below; *primary nerves* very fine, c. 20–25 pairs, raised on both surfaces, sometimes very obscure above, hardly or not distinguishable from secondaries below, reticulations slightly thickened and raised; intramarginal vein fine, c. 1 mm. from leaf margin; lower surface minutely black dotted; petiole 5–8 mm. long.

Inflorescences corymbose, terminal, not exceeding c. 8 cm. long and wide, much branched; *flowers* usually in threes or sometimes solitary at ends of branchlets, sessile or sometimes on pedicels 2–4 mm. long or the outer two flowers of the triads shortly pedicelled and the centre flower sessile; buds c. 1·3–1·4 cm. long including pseudostalk; *calyx* pale green, gland dotted, tube cyathiform, c. 6 mm. across mouth, tapering into a ridged pseudostalk c. 4–5 mm. long, mouth truncate or wavy or occasionally with exceedingly obscure teeth; after anthesis the calyx funnel shaped, c. 7 mm. across mouth; *petals* calyptrate, white; *stamens* numerous, filaments white with green bases, 1–2·5 cm. long, anthers c. 0·5 mm. long and 0·4 mm. broad, connective gland distinct; *style* a little shorter than stamens; *ovary* 2-celled, multiovulate.

Fruit more or less globular, c. 1·5 cm. diam., smooth, crowned by the very conspicuous undulating calyx rim c. 2 mm. high; pericarp 2–3 mm. thick; cotyledons nearly equal, inner faces nearly plane, attached to the hypocotyle by short broad stalks.

This species does not closely resemble any other, and is distinguished by the rather narrow long acuminate leaves and the copious corymbose inflorescences with rather large, long, narrow flowers and the almost truncate calyx mouth.

101. **Eugenia taipingensis** Henderson in Gardens' Bulletin, Singapore, XI, 327, fig. 14 (1947). (Fig. 37*c*).

PERAK: Taiping, plains, *Wray 2703*, within 100 feet, *Kunstler 8379*.
Known only from these collections.

A low *tree* with spreading branches, 4·5–6 m. tall, stem 8–13 cm. diam. *Twigs* smooth, terete, bark brown to pale whitey grey or brownish white. *Leaves* coriaceous, broadly ovate or elliptic, sometimes tending to be obovate, up to c. 6·5 cm. × 3·5 cm., apex abruptly acuminate, acumen c. 1 cm. long, base abruptly narrowed and decurrent on petiole, drying dull brown or blackish brown and minutely punctate above, usually reddish brown below, very minutely black gland dotted or not; midrib sunk above, raised below and slightly pustulate near base; *primary nerves* about 10 pairs, very slender and almost indistinguishable from secondaries and reticulations, intramarginal nerve slender c. 1 mm. from leaf margin; petiole 2–5 mm. long.

Panicles terminal, up to c. 6 cm. long and 4 cm. across, branchlets spreading, slender, angled, with brownish or greyish striate bark; *flowers* crowded at ends of ultimate branchlets; *calyx* tube in bud c. 4 mm. long and 2–2·5 mm. across mouth, narrowly campanulate, quickly contracted some way below mouth, then tapering gradually into a pseudostalk c. 2 mm. long, mouth truncate or wavy or with very obscure shallow lobes; *petals* probably calyptrate, more or less agglutinated, conspicuously gland dotted; *stamens* numerous, filaments slender, up to c. 6 mm. long, anthers c. 0·4–0·5 mm. long, connective gland conspicuous; *style* much stouter than filaments, c. 5 mm. long. *Fruit* unknown.

This species was included under *E. oleina* by King and presumably also by Ridley, but although it has a superficial resemblance to that species it is very distinct in its broader and more acuminate leaves with the nervation raised above, and in its truncate calyx mouth.

102. **Eugenia nigricans** King, Mat. F.M.P., No. 12, 114 (1901); Ridl., F.M.P., I, 751. *Syzygium nigricans* (King) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 194 (1939). (Fig. 37*d*).

TRENGGANU: Gunong Padang, 4,000 feet, *SFN 33903* (*Moysey & Kiah*), specimens in young fruit with leaves larger and thicker than the type, and referred here with some doubt. They may represent a mountain variety.
KEMAMAN: Bukit Kajang, *Corner s.n.*, leaf specimens with leaves larger than the type, and referred here with a little doubt.
PENANG: sine loc., *Curtis 976;* between Balik Pulau and Pulau Betong, *Curtis 937* in part.
PERAK: Waterfall hill, Taiping, 1,000 feet, *Wray 2221* (type collection); sine loc., *Scortechini 203.*.
MALACCA: sine loc., *Griffith s.n.*
NEGRI SEMBILAN: Bukit Tangga, *SFN 11828* (*Nur*).
PAHANG: Sungei Endau, *Forest Dept. FMS 6766;* Kuantan, *Forest Dept. FMS 8128.*
JOHORE: Pinerong, *Cantley s.n.;* Jason Bay, *SFN 28497, 28522* (*Corner*).
SINGAPORE: Bukit Timah, *SFN 34988* (*Corner*), *SFN 36128, 36531, 37015* (*Ngadiman*).
Distrib: Borneo.

A tall massive *tree*, trunk slightly fluted at base or with narrow low buttresses, sometimes stilt rooted; bark smooth, entire or slightly longitudinally fissured and flaky,

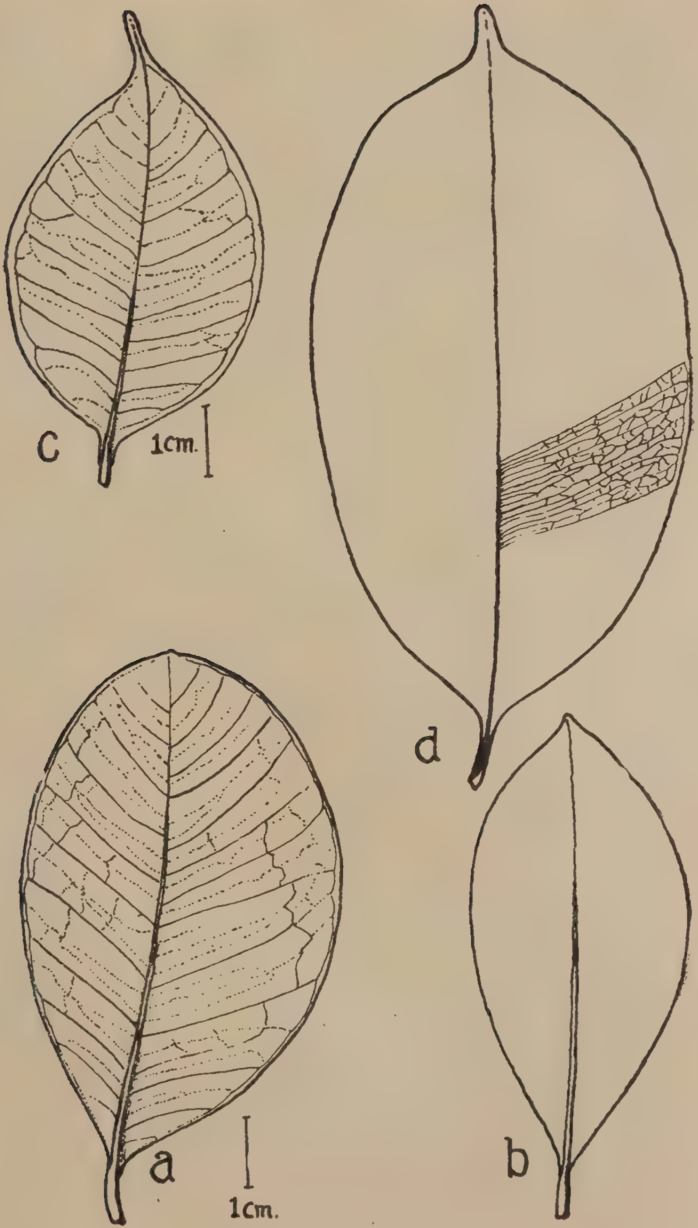
C
1cm.
d
a
1cm.
b

Fig. 37. a, b, *E. pallidula;* c, *E. taipingensis;* d, *E. nigricans*, upper surface.

not papery or rugose, scaling in small thin irregular pieces, leaving areas of entire more or less pustulate bark, pale grey or pinkish grey to pale rufous fawn; inner bark reddish pink, pinkish brown or deep purple brown, thick, more or less fibrous, with sticky pale sap, sapwood thin, pale, heartwood red brown. *Twigs* slender, terete, when dry with brown smooth or flaky bark. *Leaves* coriaceous, narrowly elliptic to elliptic oblong or oblong, apex rather shortly and abruptly acuminate, base cuneate, from c. 6–12 cm. long and 3·5–5·5 cm. broad, upper surface more or less shining when dry and dark olivaceous or brownish, minutely punctate or pustulate, lower surface dull, tinged reddish or brownish, sometimes minutely pustulate; midrib impressed above, elevate below; *primary nerves* very numerous and close together, running nearly straight to an intramarginal nerve close to leaf margin, raised and fine on both surfaces, but more distinct above, joined by close reticulations which are almost as distinct as primaries above but faint below; petiole up to c. 1 cm. long.

Panicles terminal and axillary, not more than about half length of leaves, rather densely flowered, branches and branchlets slender, 4-angled or compressed, bracts and bracteoles minute, broad, subpersistent; *flowers* white, sessile in threes or clusters at branchlet ends, buds clavate c. 5 mm. long; *calyx* funnel shaped or narrowly campanulate, slightly ridged, c. 4–4·5 mm. long, c. 2·5 mm. across mouth, narrowed into a rather slender pseudostalk c. 2 mm. long; mouth with 5 very shallow very obscure deciduous lobes; *petals* calyptrate, the outer one partially free; *stamens* numerous, filaments slender, up to c. 6–7 mm. long, anthers ovate or ovate oblong, c. 0·4 mm. long, connective gland conspicuous; *style* stouter than filaments, c. 3·5 mm. long; *ovary* 2-celled.

Characterised by the fine raised close reticulation on the upper surface of the leaves.

103. **Eugenia cerasiformis** (Bl.) DC., Prodr., III, 274 (1828). *Myrtus cerasiformis* Bl., Bijdr., 1088 (1826). *Syzygium cerasiforme* (Bl.) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 187 (1939). *Syzygium javanicum* Miq., Fl. Ind. Bat., I, i, 461 (1855); Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 188, excl. syn. S. euneuron Miq. *Syzygium racemosum* (Bl.) DC., loc. cit., 261; Merr. & Perry, loc. cit., 189. *Eugenia expansa* Duthie in Hook. fil., F.B.I., II, 491 (1878); King, Mat. F.M.P., No. 12, 113, pro parte; Ridl., F.M.P., I, 745; non E. expansa Mart. (1837). *E. jamboloides* Koord. & Valet. in Meded. Lands Plantent., XL, 136 (1900);

Atlas Baumart. Java, III, fig. 497; Backer, Schoolflora voor Java, 512 (1911). *? E. laxiflora* Koord. & Valet. in Meded. Lands Plantent., XL, 139 (1900); Atlas Baumart. Java, III, figs. 498, 499. *E. javensis,* Koord. & Valet. in Meded. Lands Plantent., XL, 141 (1900); Atlas Baumart. Java, III, fig. 451. *E. Zippeliana* Koord. & Valet. in Meded. Lands Plantent., XL, 142 (1900); Atlas Baumart. Java, III, fig. 500. *E. Robinsoniana* Ridl. in Journ. F.M.S. Mus., IV, 13 (1909); F.M.P., I, 734. *E. Evansii* Ridl. in Journ. F.M.S. Mus., X, 134 (1920); F.M.P., I, 747. *E. brunneoramea* Merr. in Univ. Calif. Publ. Bot., XV, 217 (1929). *E. euneura* Craib, Fl. Siam. Enum., I, 640 (1931) non Syzygium euneuron Miq. (Fig. 38*a*).

Not rare in lowland forest from Langkawi to Malacca and Pahang. A collection of *Cantley's* from Singapore appears to be wrongly localised.

Distrib: Siam, Sumatra, Borneo, Java.

A *tree. Twigs* slender, terete, bark drying brownish or greyish, smooth. *Leaves* coriaceous, oblong elliptic or oblong lanceolate or oblong or elliptic, apex acute or shortly acuminate, base cuneate, from c. 8 cm. × 3 cm. to 18 cm. × 7 cm., both surfaces brown or reddish brown when dry, the upper sometimes blackish and minutely punctate, the lower paler; midrib impressed above, elevate below; *primary nerves* 15–25 pairs, 4–10 mm. apart, spreading and curving up to an intramarginal nerve 1–3 mm. from leaf margin, slightly raised and indistinct above, raised and slender below, usually distinct, secondaries and reticulations less distinct than primaries; petiole usually not more than c. 5 mm. long, occasionally c. 1 cm.

Panicles terminal and axillary, often clustered, variable in length from c. 3 cm. to c. 7 cm., the longer ones with a few slender branches, the shorter ones sometimes rather densely flowered; *flowers* white, sessile, in threes or groups of several at branchlet ends, bracts and bracteoles minute, triangular acute, subpersistent; buds clavate; *calyx* funnel shaped, c. 6 mm. long and 3 mm. across mouth, finely rugulose gland dotted, rather gradually contracted into a pseudostalk c. 2–3 mm. long, mouth truncate or undulate with a thin margin; *petals* falling in a gland dotted calyptra c. 3 mm. diam.; *stamens* numerous, filaments slender, subulate, from 2–6 mm. long, anthers ovate oblong, 0·5–0·7 mm. long, connective gland conspicuous; *style* much stouter than filaments, c. 6 mm. long; *ovary* 2-celled.

Fruit depressed globose or transversely oblong globose, c. 2 cm. across, finely rugulose papillate when dry, apical umbilicus very shallow, c. 4 mm. diam., bearing the very short undulate calyx rim; pericarp thin; cotyledons side by side, nearly equal, testa rather thick, adhering to the rugose cotyledon surfaces; inner faces somewhat concave, attached to hypocotyle near their centres by short broad stalks.

When Craib made a new combination for this plant, it appears probable that he followed King's reduction of *Syzygium euneuron* Miq. without seeing Miquel's plant. I have examined a duplicate of Miquel's type from Leiden and consider it to be very distinct from our plant in the distinctly 4-angled and very narrowly winged uppermost twigs; in the impressed primary nerves above, which are much more prominent below than in *E. cerasiformis*, and are more widely spaced and more distinct from the secondaries; in the intramarginal nerve further from the leaf margin; and in the more caudate acuminate leaf apex.

Myrtus cerasiformis Bl. was reduced (as *Jambosa cerasiformis* Hassk.) to *E. lineata* Duthie (*E. longiflora* F. Vill.) by Koorders & Valeton, but an examination of the type of Blume's plant, which is in fruit, shows very clearly that this reduction is erroneous. Although Blume's specimen has no flowers it corresponds so closely in all other points with our plant that I have no doubt that it is the same.

I have been able to examine long series of specimens of *E. jamboloides* K. & V., *E. javensis* K. & V., and *E. Zippeliana* K. & V., and have come to the conclusion that they vary from *E. cerasiformis* only in such relatively minor points as the colour of the bark of the twigs and the length and modes of branching of the inflorescence.

104. **Eugenia conglomerata** Duthie in Hook. fil., F.B.I., II, 497, (1878); King, Mat. F.M.P., No. 12, 101; Ridl., F.M.P., I, 742. (Fig. 38*b*).

SELANGOR: Sungai Pelek, Sepang, *Denny 56, 61;* Serdang Experimental Plantation, cultivated, *Corner s.n.*
MALACCA: sine loc., *Maingay K.D. 745* (type collection), *Alvins s.n., 422;* Gunong Ledang, *Ridley s.n.*
SINGAPORE: Botanic Gardens, *Ridley 5073, 10836, Gardens No. M 1502* (Nur); sine loc., *Cantley s.n.*
Distrib: Endemic.

Tall massive *tree* with steep rounded narrow buttresses; bark slightly fissured, somewhat flaky and scaling in small rectangular pieces, reddish brown to warm brown; inner bark pinkish brown or fawn pink, rather thick, more or less fibrous; wood pale. Youngest *twigs* more or less 4-angled with dark brown bark when dry, older twigs terete with greyish or brownish smooth. *Leaves* coriaceous, oblanceolate to narrowly obovate, apex subacute or blunt, base long narrowed, from c. 5 cm. × 2 cm. to 10 cm. × 5·5 cm., but usually c. 7–8 cm. × 3–3·5 cm., upper surface

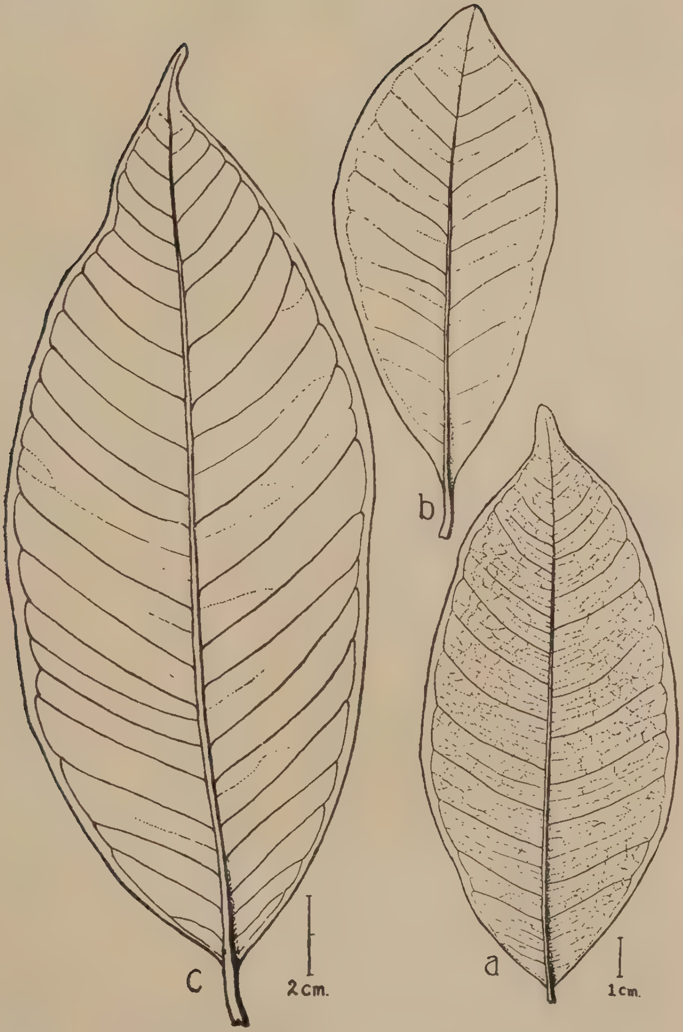

Fig. 38. a, *E. cerasiformis;* b, *E. conglomerata;* c, *E. leptostemon.*

shining, drying blackish brown, finely rugose, lower surface dull, liver brown, closely and minutely glandular pustulate; midrib slightly elevate or flat above, elevate below and keeled or longitudinally wrinkled; *primary nerves* c. 8–12 pairs, spreading and curving up to a very obscure intramarginal nerve 2–3 mm. from the recurved leaf margin, raised on both surfaces, usually rather thick and distinct above, very fine and faint or almost invisible below, secondaries and reticulations almost or quite invisible; petiole up to c. 1 cm. long, the leaf blade sometimes decurrent upon it.

Inflorescences of short fascicled spikes from small tubercles on the older twigs below the leaves, up to c. 1 cm. long, the rachis 4-angled, the *flowers* crowded at the apices of the spikes with one or two lower down, sessile; calyx red to purple, petals and stamens white; bracts and bracteoles persistent, triangular subacute, less than 0·5 mm. long; buds broadly obconic, c. 2·5–3 mm. long; *calyx* broadly funnel shaped or somewhat campanulate, c. 2–2·5 mm. long, and as much across mouth; lobes 4, persistent, broad, rounded, or subacute, c. 1·5 mm. across and 1 mm. tall; *petals* 4, free, broadly ovate rounded, or orbicular, c. 1·6–2 mm. across and 1–1·5 mm. tall, thin, sparsely gland dotted; *stamens* numerous, filaments subulate, from almost none to c. 2·5 mm. long, anthers oblong, 0·3–0·4 mm. long, connective gland small; *style* stout, 4-angled, less than 1 mm. long; *ovary* 2-celled, with several ovules in each cell.

Fruit depressed globose, sometimes more or less globose, up to c. 1 cm. long and 1·25 cm. across, shining dark purplish red when ripe, apical calyx rim not prominent, the umbilicus shallow, c. 3 mm. diam., with the 4 fleshy incurved calyx lobes and remains of style and stamens; pericarp juicy pulpy, c. 3 mm. thick, deep red pink, slightly acid and astringent, stripping easily from the seed and leaving testa on cotyledons; seed 1, much depressed globose, c. 5 mm. high and 7·5 mm. across, testa very thin, brown, papery fibrous; cotyledons side by side, stalked, pale green, finely gland dotted, inner faces deeply folded to accommodate the large terete truncate pale green gland dotted hypocotyle which reaches outer surface of cotyledons, point of attachment of cotyledons nearly central, with very broad short stalks, plumule hidden under fold; germination epigeal. When the cotyledons begin to move apart on germination, the broad stalks curving round to meet the hypocotyle are clearly seen and the structure is like that of *E. malaccensis* in miniature.

A distinct species in its large size, the rather small oblanceolate blunt faintly nerved leaves and the very short crowded spikes of small flowers from below the leaves.

E. conglomerata Duthie var. **paniculata** var. nov.

A typa inflorescentiis paniculatis ad 4 cm. longis differt.

JOHORE: Sungai Kayu Ara, Mawai-Jemaluang road, on hillock in *Dryobalanops* forest, *SFN 29368* (*Corner*), TYPE collection, holotype in Herb. Singapore.

The inflorescences of the typical form are, at their longest, in fruit, c. 1·2 cm. and spicate. The inflorescences of the variety have one or two pairs of branchlets up to c. 1·5 cm. long, those and the peduncle stout, ridged and angled. Only one collection of the variety is known, a fallen branch from a tree which the collector notes as evidently fairly big.

105. **Eugenia leptostemon** (Korth.) Miq., Fl. Ind. Bat., I, i, 442 (1858). *Jambosa leptostemon* Korth., Nederl. Kruidk. Arch., I, 201 (1847). *Syzygium leptostemon* (Korth.) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 156 (1939). *Eugenia urceolata* King, Mat. F.M.P., No. 12, 101 (1901); Ridl., F.M.P., I, 742; non Jambosa urceolata Korth., vel Eugenia urceolata Cordem. (1895). *Eugenia rotata* Craib, Fl. Siam. Enum., I, 660 (1931). *E. subracemosa* Merr. in Journ. Roy. As. Soc. Str. Br., LXXIX, 23 (1918). (Fig. 38*c*).

Common in lowland forest from Kedah to Singapore, occasionally in hill forest. Not recorded from Penang. *Distrib:* Siam, Bangka, Borneo.

A small slender *tree,* or up to c. 18 m. tall, trunk cylindric at base or slightly buttressed; bark smooth, entire, slightly pustulate, light grey, slightly pinkish fawn; inner bark pinkish fawn. Youngest *twigs* obtusely 4-angled and grooved, drying smooth and reddish brown, older twigs terete or slightly angled, bark pale grey or pale brown, wrinkled or somewhat flaky. *Leaves* coriaceous, elliptic, elliptic oblong or obovate elliptic, apex shortly and bluntly acuminate, base cuneate, from c. 9–24 cm. long and 3·5–12 cm. broad, usually c. 12–18 cm. × 6–9 cm., upper surface drying dark brown to blackish brown, shining, minutely punctate, lower surface reddish brown, dull, with minute raised dark gland dots; midrib broad and flat above or slightly raised and channelled, elevate below and keeled; *primary nerves* 12–20 pairs, 1–2 cm. apart, obliquely ascending to a prominent shallowly looped intramarginal nerve 3–6 mm. from leaf margin, finely channelled above, elevate and very distinct below, sometimes broad and dark coloured, the few lax reticulations faint; petiole up to c. 1 cm. long, usually above 5 mm.

Inflorescences from small tubercles on the twigs below the leaves, very occasionally axillary or terminal, solitary or several together, subracemose, from c. 1·5–5 cm. long, or fascicled, or occasionally paniculate, the rachis, and branches when present, slender; *flowers* white, sessile, usually 5 at the distal end of the rachis, with 1 or 2 pairs lower down, or in groups of three at ends of branches; *calyx* 6–8 mm. long, and about 5–6 mm. across mouth, subturbinate, rather abruptly contracted below lobes and narrowed to a slender pseudostalk; lobes 4, persistent, gland dotted, slightly unequal, broadly ovate rounded, the two outer rather thick, c. 4 mm. across and 2 mm. tall, the inner with thin margins, c. 3 mm. tall; the calyx eventually opening out into a flat disc; *petals* 4, free, spreading, orbicular, gland dotted, 5–6 mm. diam.; *stamens* numerous, filaments slender, subulate, reaching nearly 1 cm. long, anthers ovate orbicular, 0·2–0·3 mm. long; *style* much stouter than filaments, subulate, c. 7 mm. long; *ovary* 2-celled.

Fruit ovoid globose, c. 1·5 cm. long, vertically ridged or corrugate, apical umbilicus c. 4 mm. diam., fringed by the very short calyx rim and the 4 hardly enlarged calyx lobes; pericarp thin and leathery (in dried fruits); seed 1, oblong globose, c. 1·2 cm. long, testa leathery, adhering closely to the rugose surface of the cotyledons; cotyledons nearly equal, side by side, inner faces gland dotted, excavate, attached by very broad, very short stalks to the large gland dotted hypocotyle which lies in a fold of the cotyledon faces and reaches the periphery of the seed.

This species is distinguished by the spaced and distinct obliquely ascending primary nerves of the leaf, the short subracemose inflorescences usually from below the leaves and the calyx opening out after anthesis into an almost flat disc.

106. **Eugenia pseudosubtilis** King, Mat. F.M.P., No. 12, 123 (1901), incl. var. *platyphylla* et var. *subacuminata* King; Ridl., F.M.P., I, 746; Craib, Fl. Siam. Enum., I, 657; Corner, Wayside Trees of Malaya, p. 502, fig. 168. *E. cinerea* Ridl., F.M.P., I, 744, quoad specimina malayana, non Kurz ? *Syzygium minutiflorum* Miq., Fl. Ind. Bat., Suppl. I, 311 (1860). (Fig. 39*c*).

Common in the lowlands, especially in the north of Malaya, in villages and ricefields. Not uncommon in the freshwater swamp forest of S.E. Johore, and in Singapore.
Distrib: Siam, Sumatra, ? Borneo, ? Indo-China.

A *tree* reaching c. 25 m. tall, trunk cylindric or slightly fluted and buttressed at base; bark of older trees deeply cracked or almost fissured vertically, with finer crevices vertically and horizontally, sometimes scaling slightly, surface between cracks smooth or rugulose, pale whitey grey or greyish buff; of younger trees smooth and entire, or finely creviced longitudinally, sometimes slightly pimply with inconspicuous lenticels, scaling in rather thick pieces or not, whitey grey or light pinkish grey; inner bark pinkish brown; wood pale, flesh colour or yellowish, turning fuliginous on exposure. *Twigs* terete, bark smooth, drying whitey grey or yellowish grey, the youngest parts sometimes pale brown. *Leaves* thickly coriaceous, oblong elliptic or narrowly elliptic, occasionally somewhat obovate, apex blunt or subacute or shortly and broadly apiculate, base cuneate, from c. 5–16 cm. long and 2·5–7 cm. broad, usually c. 7–11 cm. × 4–5 cm., upper surface dull, drying pale brown to blackish brown, closely and minutely punctate, lower surface paler; midrib impressed above, prominent below and often pustulate towards the petiole; *primary nerves* 6–10 pairs, usually c. 1 cm. apart, impressed above and usually faint, more or less raised below and fine, usually distinct, curving up to a faint or obscure intramarginal nerve 2–4 mm. from leaf margin; secondaries and reticulations usually very faint; petiole up to c. 1·5 cm. long, the leaf blade sometimes narrowly decurrent upon it.

Panicles terminal and axillary, occasionally from twigs below the leaves, often clustered, usually as long as or shorter than the leaves, occasionally overtopping them, on peduncles shorter than the leaves, branches few, distant, divaricate, trichotomous, slender and 4-angled or compressed; *flowers* with reddish calyx, yellowish stamens and petals, sessile in threes at ends of the short ultimate branchlets; bracts and bracteoles short and broad, caducous or subpersistent; *calyx* after anthesis funnel shaped or slightly campanulate, finally somewhat urn shaped, c. 3 mm. long, c. 2·5 mm. across mouth, tube finely gland dotted, slightly narrowed to base, mouth with 4 broad very shallow rounded rather obscure lobes; *petals* calyptrate; *stamens* numerous, filaments subulate, glandular, up to c. 2 mm. long, anthers oblong or ovate oblong, c. 0·5–0·7 mm. long, connective gland conspicuous; *style* stouter than filaments, c. 1 mm. long; *ovary* 2-celled, multiovulate.

Fruit depressed oblong globose, pink to almost black, c. 1·5 cm. diam., 1·2 cm. high, apex deeply and narrowly excavate with minute remains of calyx rim; pericarp pulpy fleshy, with fibrous strands, 3–4 mm. thick; seed 1, inner cotyledon faces gland dotted, ridged, attached near their centres by broad short stalks to the rather large hypocotyle.

The seeds are nearly always infected with the larvae of a species of phytophagous Braconidae (fide H. M.

Pendlebury). The only uninfected seeds so far found out of many hundreds examined are those of Ridley's Perlis collection.

It seems probable that the correct name for this plant is *Eugenia borneensis* Miq., Anal. Bot. Ind., I, 24, t. 7 (1850). Our material agrees fairly well with Miquel's description and plate, but certain differences as figured by Miquel, notably the free, not calyptrate petals and the more abruptly narrowed calyx tube, along with the fact that no material of Miquel's species has been available for comparison, make it advisable that the formal reduction should not be made until Miquel's type can be compared with our plant. An argument in favour of reduction is that Merrill and Perry (Mem. Amer. Acad. Arts & Sci., XVIII, 3, 190 (1939)) reduce *E. microcalyx* Duthie to *E. borneensis* Miq. apparently on the basis of *Kunstler 10733* and *Kunstler 10735*, both named *E. microcalyx* by King, and on a later collection from the Malay Peninsula, the details of which are not given. *Kunstler 10735* is *E. pseudosubtilis*. *Kunstler 10733* I have not seen, but as noted below, King's determinations of *E. pseudosubtilis* and *E. microcalyx* were not always reliable. Typical *E. microcalyx* could hardly be reconciled with Miquel's description and figure of *E. borneensis.*

Ridley refers part of *E. pseudosubtilis* to *E. cinerea* Kurz. Kurz included Wall. Cat. 3576 in his species, but this is undoubtedly *E. pseudosubtilis* and not the Burmese plant. Craib, Fl. Siam. Enum., I, 634, selects the Burmese plant as the type of *E. cinerea* in spite of the fact that Kurz used Wallich's specific name and I have followed this procedure here. Merrill and Perry in Journ. Arn. Arb. XIX, 106, accept Ridley's disposition of *E. pseudosubtilis* var. *platyphylla,* but their remarks make me suspect that the Indo-Chinese plants which they refer to *E. cinerea* are really *E. pseudosubtilis.*

E. pseudosubtilis is closely allied to *E. microcalyx,* and although the typical forms of each are easily separable even on foliage characters alone, considerable difficulty may be found in placing correctly specimens which appear to combine the characters of *E. microcalyx* var. *irregularis* and of the broader leaved more strongly nerved forms of *E. pseudosubtilis.* Judging from the annotations on sheets in Herb. Calcutta and Herb. Singapore, there was considerable confusion in King's mind over the identity of the two species, "microcalyx" having been substituted, in my opinion wrongly, for "pseudosubtilis" many times, even *Kunstler 6946* and *Ridley 4990,* syntypes of *E. pseudosubtilis,* being treated in this manner.

The main distinguishing points between the two species are—(1) the very pale bark of the twigs in *E. pseudosubtilis* compared with the dark bark of *E. microcalyx* (this character breaks down in *E. pseudosubtilis* var. *montana*); (2) the more coriaceous texture of the leaves in *E. pseudosubtilis;* (3) the generally longer inflorescences on longer peduncles in *E. microcalyx;* (4) the persistent bracteoles in *E. microcalyx;* (5) the smaller flowers of *E. microcalyx;* (6) the broad blunt calyx lobes of *E. pseudosubtilis* compared with the very small narrow acute lobes in *E. microcalyx;* (7) the dark red or almost black ripe fruit of *E. pseudosubtilis* compared with the white tinged pink fruit of *E. microcalyx.*

E. pseudosubtilis King, var. **montana** var. nov.

A typa foliis valde coriaceis plus minusve ovatis (ad 8·5 cm. longis et 5 cm. latis), nervis primariis subtus plus minusve prominentibus, apice obtuse acuminatis, cortice ramulorum fusco differt.

PAHANG: "Telom", *Ridley 13901* (inflorescences more copious and longer than in other specimens quoted here); 47th mile, Telom road, *SFN 31258* (*Holttum*), TYPE collection, holotype in Herb. Singapore; Cameron Highlands, 3,700 feet, *SFN 32734* (*Nur*); Fraser Hill, *Forest Dept. FMS 7796.*

This group has been kept separate because it may be found to represent a distinct species closely allied to *E. pseudosubtilis* and *E. microcalyx.*

King's varieties *platyphylla* and *subacuminata* are not worth keeping up.

107. **Eugenia microcalyx** Duthie in Hook. fil., F.B.I., II, 493 (1878); King, Mat. F.M.P., No. 12, 124, incl. var. *obovata* pro parte; Ridl., F·M.P., I, 745. (Fig. 39*a*).

An endemic species not uncommon in lowland forest and secondary growth from Penang to Singapore on the west side of the Main Range.

A *tree* up to c. 15–16 m. tall. Youngest *twigs* somewhat 4-angled with smooth bark drying dark brown, older twigs terete with paler brown bark. *Leaves* coriaceous, lanceolate or oblong lanceolate to oblanceolate or obovate, apex subacuminate or blunt, long narrowed to base, from c. 5 cm. × 2 cm. up to c. 14 cm. × 7 cm., usually about 8 cm. × 3 cm., upper surface drying blackish brown to black, slightly polished, minutely and closely punctate, often appearing minutely rugulose, lower surface red brown with minute concolorous or darker pustulations; midrib impressed above, elevate below and rather obscurely pustulate; *primary nerves* about 10 pairs, more or less impressed and

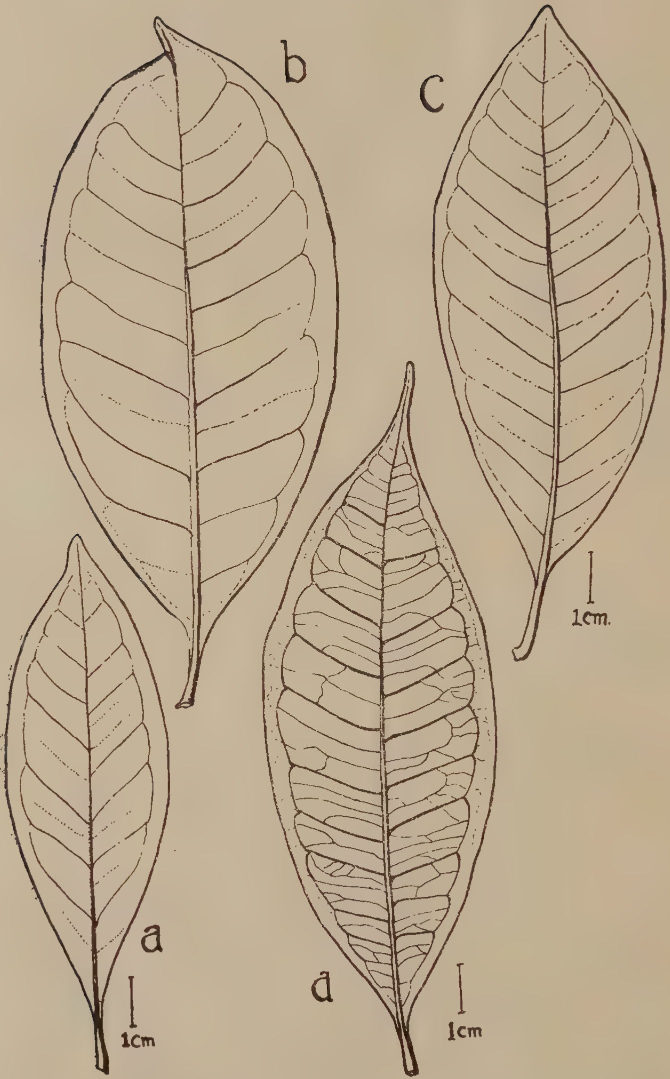
b
c
a
1cm
d
1cm
1cm.

Fig. 39. a, *E. microcalyx;* b, *E. microcalyx* var. *irregularis;* c. *E. pseudosubtilis;* d, *E. Kunstleri.*

faint above, raised and fine below, distinct or indistinct, slightly ascending and running nearly straight to a distinct or indistinct intramarginal nerve 2–4 mm. from the strongly and irregularly recurved leaf margin; petiole 0·5–1 cm. long, the leaf blade more or less decurrent upon it.

Panicles terminal and axillary, sometimes clustered, usually exceeding the leaves, on peduncles as long as or longer than the leaves, sometimes sessile, reaching 12–14 cm. long, branches and branchlets rather lax, spreading, slender, angled or compressed, with brownish and obscurely pustulate striate bark; bracts and bracteoles minute, triangular acute, persistent; *flowers* yellowish white in threes or clusters at branchlet ends, sessile; *calyx* finely glandular pustulate, subcylindrical, a little over 2 mm. long and c. 1·2 mm. across mouth, very slightly tapered at base; mouth with 4 distant very short obscure triangular acute persistent lobes; *petals* falling in a calyptra, but not or very slightly agglutinated, orbicular, sparsely pellucidly gland dotted, c. 1·2–1·4 mm. diam.; *stamens* less than 20, filaments rather stout, flattened below, subulate above, up to c. 1 mm. long, anthers ovate c. 0·2–0·3 mm. long, connective gland inconspicuous; *style* narrowly conical c. 0·5 mm. long; *ovary* 2-celled.

Fruit waxy white tinged with red, finely rugose when dry, globose or depressed globose, c. 4–5 mm. diam., apical umbilicus very shallow, hardly excavate, c. 2 mm. diam., fringed by the slightly enlarged calyx lobes; seed 1, more or less globose, cotyledons nearly equal, side by side, inner faces gland dotted, nearly plane or somewhat concave, attached to hypocotyle near periphery, the plumule and radicle sunk in a fold of one cotyledon face.

See notes on *E. pseudosubtilis.*

E. microcalyx Duthie var. **irregularis** (Craib) var. nov. (Fig. 39*b*).

Eugenia irregularis Craib in Kew. Bull. 167 (1930); Fl. Siam. Enum., I, 646. *E. microcalyx* Corner, Wayside Trees of Malaya, p. 500. *Syzygium irregulare* (Craib) Merr. & Perry in Journ. Arn. Arb., XIX, 107 (1938).

NEGRI SEMBILAN: Seremban, *Corner s.n.*
SINGAPORE: Bukit Mandai, *Ridley 10410;* Economic Gardens, *Ridley 12482;* Reservoir Jungle, *SFN 29495, 30995, 30996* (*Corner*); Botanic Gardens, *SFN 36530* (*Kiah*).
Distrib: Siam, Indo-China.

A small *tree;* bark more or less smooth, finely shortly irregularly creviced or occasionally with slight fissures, scaling in small irregular pieces, pale pinkish grey to whitish grey, a very thin inconspicuous green layer immediately below surface; inner bark thick and fibrous with copious watery sap, pale pinkish buff, darkening rapidly on exposure; wood almost white. Young *twigs* terete, rather stout, green in life, drying reddish brown. *Leaves* elliptic or oblong elliptic or obovate, apex shortly and abruptly acuminate, acumen blunt or acute, base narrowed or cuneate, up to c. 20 cm. × 9·5 cm., upper surface rather dark shining green and more or less bullate in life, dark brown when dry, minutely black dotted, lower surface paler green, drying brown and minutely black dotted; midrib impressed above, prominent and rounded below; *primary nerves* up to c. 16 pairs, impressed above, prominent below, running nearly straight or curving gently up to a conspicuous intramarginal nerve c. 5 mm. from leaf margin; secondaries few, fine, reticulations lax, hardly visible; petiole stout, up to c. 1 cm. long, black when dry.

Panicles terminal, branched from base, up to c. 16 cm. long, branches distant, the lower ones ascending, the upper nearly horizontal and shorter, green in life and somewhat angled or compressed, brownish and striate when dry; *flowers* sessile or sometimes on very short stout pedicels, in twos or threes, or occasionally subcapitate at the ends of the ultimate branchlets, bracts and bracteoles minute, persistent, triangular acute, 3 at base of each flower; *calyx* yellowish shading to greenish at base, gland dotted, obconic, without pseudostalk, c. 3 mm. long, lobes 5, very small and distant, broadly triangular acute, less than 0·5 mm. tall; *petals* 5, white, falling as a calyptra but not agglutinated, more or less orbicular, c. 1·5–2 mm. diam., with sparse yellow gland dots; *stamens* c. 25, from 0·5–2 mm. long, filaments strap-shaped at base, subulate above, anthers small, connective gland yellowish; *style* narrowly conical, c. 1 mm. tall; *ovary* 2-celled.

Fruit pink when ripe with inconspicuous white dots, or white on one side, more or less globose, oblong globose or depressed globose, c. 4–5 mm. diam., 3·5–4 mm. tall, apical umbilicus shallow and rather wide, c. 1·5–2 mm. diam., bearing the hardly enlarged incurved calyx lobes and remains of stamens and style base; pericarp juicy, white, rather thick, nearly 1 mm. in places; seed 1, more or less reniform or oblong, c. 3·5 mm. long, cotyledons superposed, outer surface inconspicuously gland dotted, more or less equal, inner faces oblique, nearly plane, attached to hypocotyle at periphery, the small radicle and plumule sunk in a slight fold in the edge of one cotyledon.

The larger and broader leaves with more pronounced venation distinguish this variety from the typical form.

108. **Eugenia myriantha** King, Mat. F.M.P., No. 12, 125 (1901); Ridl., F.M.P., I, 745. (Fig. 40*f*).

PERAK: sine loc., *Scortechini 337* (type collection).
Distrib: Endemic.

A tall *tree.* *Twigs* terete. *Leaves* very coriaceous, elliptic lanceolate to oblanceolate, apex subacute, base narrowed, up to c. 4·5 cm. × 2 cm., upper surface polished, drying pale brown, punctate, lower surface dull, darker brown, subglaucous; midrib impressed above, elevate below; *primary nerves* 3 or 4 pairs, ascending, distant, very faint and obscure on both surfaces, reticulation invisible; petiole up to c. 8 mm. long.

Panicles terminal or from upper leaf axils, numerous, pedunculate, up to c. 7 cm. long, the branches numerous and spreading, rather slender, angled; *flowers* sessile in clusters at ends of the short quadrangular branchlets, subtended by minute subpersistent broad bracteoles; *calyx* cylindric, c. 2 mm. long.

Known only from one collection. This species approaches some forms of *E. pseudosubtilis* and may not be more than a variety of that variable species. The leaves, however, are much smaller and thicker than in any form of *E. pseudosubtilis* that I have seen, the upper surface pitted and the nerves obscure on both surfaces.

There is no indication of the locality on the label, but the appearance of the specimens suggests that it is a mountain or ridge top plant, although a note, ? in Scortechini's hand, pinned to one sheet in Herb. Calcutta, describes it as a tall tree.

109. **Eugenia Kunstleri** King, Mat. F.M.P., No. 12, 127 (1901); Ridl., F.M.P., I, 746. *E. albidiramea* Merr. in Univ. Calif. Publ. Bot., XV, 221 (1920). *Syzygium albidirameum* (Merr.) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 190 (1939). (Fig. 39*d*).

KEMAMAN: Bukit Kajang, 500 feet, *SFN 30322, 30420, 30492* (*Corner*).
PENANG: sine loc., *Curtis 179* (syntype).
PERAK: Larut, up to 800 feet, *Kunstler 3310* (syntype), 200–500 feet, *Kunstler 3680* (syntype).
JOHORE: 5½ mile, Kota Tinggi-Mawai road, *SFN 29301* (*Corner*); Sungai Sedili, *SFN 36920* (*Corner*).
SINGAPORE: Botanic Gardens, *Ridley 6418;* Mandai road, *SFN 37725* (*Kiah*).
Distrib: Borneo.

A *tree* reaching c. 24–25 m. tall, trunk cylindric or slightly fluted at base; bark distinctly though thinly papery flaky, slightly pustulate with scattered lenticels, pallid rufous fawn or orange rufous; inner bark rather thick, pale pinkish or brownish buff or yellowish brownish, turning mauvish or brownish on exposure; wood pallid buff. *Twigs* slender, terete, bark smooth and somewhat polished, drying pale, the youngest shoots obscurely quadrangular with brown pustulate bark. *Leaves* thinly coriaceous, oblong lanceolate or elliptic lanceolate to ovate lanceolate or narrowly elliptic, apex acuminate, base cuneate or long narrowed, from c. 6·5–19 cm. long and 3–6 cm. broad, upper surface dull, drying brown to blackish brown, very minutely and closely black dotted, punctate or obscurely pustulate, lower surface brown or reddish brown, minutely glandular pustulate; midrib narrowly and deeply impressed above, prominent below, rugose pustulate; *primary nerves* 8–12 pairs, c. 1–1·5 cm. apart, more or less impressed above and rather faint, bold below, more or less pustulate, nearly straight or curving up to a bold looped intramarginal nerve c. 4–5 mm. from leaf margin, with a much fainter series of loops close to the margin; secondaries and lax reticulations usually invisible above, very fine and faint below; petiole up to c. 1·5 cm. long, rather slender, rugose when dry, deeply channelled above.

Panicles terminal or from upper leaf axils, often clustered, shortly pedunculate, reaching c. 12 cm. long but usually much shorter than the leaves, peduncle, rachis and the many spreading branches slender, 4-angled, drying brown and minutely pustulate; *flowers* sessile or occasionally on very short stout pedicels, in threes at ends of the short ultimate branchlets; calyx green, petals and filaments white; *calyx* funnel shaped, quadrangular, c. 3 mm. long and 2 mm. across mouth, narrowed at base or contracted rather suddenly into a pseudostalk varying from less than 0·5 mm. to c. 1 mm. long; mouth with 4 obscure broad rounded subpersistent lobes less than 0·4 mm. tall; *petals* 4, free, orbicular, 1·5–2 mm. diam., or falling in a calyptra, either completely agglutinated or partially so; *stamens* about 20, filaments rather stout, flattened, less than 1 mm. long, anthers elliptic, c. 0·3 mm. long, connective gland small; *style* rather slender, c. 0·7 mm. long; *ovary* 2-celled.

Fruit ovoid or obovoid, c. 1·5 cm. long, 1·25 cm. across, smooth, somewhat narrowed at base, apical umbilicus very shallow, c. 3 mm. diam., fringed by the very short calyx rim; pericarp thin and tough, seed with large blunt conspicuous hypocotyle reaching periphery.

E. albidiramea Merr. is known from fruiting specimens only, but although the fruit of the type (*Elmer 21762*) is larger and more deeply wrinkled than in any Malayan collection, that of *Elmer 21518*, cited in the original description, corresponds exactly to several of our collections, and two flowering collections which match the type of *E. Kunstleri* very closely have been made in Borneo. They are *SFN 36098* (*Daud & Tachun*) from Gunong Gading, Sarawak, and *SFN 26869* (*Carr*) from Tenompok, Mt. Kinabalu.

This species is allied to *E. pustulata* but differs in the less oblong leaves, the more slender inflorescence branches and the smaller flowers.

110. **Eugenia polyantha** Wight, Ill., II, 17 (1841); Duthie in Hook. fil., F.B.I., II, 496; King, Mat. F.M.P., No. 12, 103; Ridl., F.M.P., I, 742; Koord. & Valet. in Meded. Lands Plantent., XL, 88; Atlas Baumart. Java, III, figs. 470, 471; Craib, Fl. Siam. Enum., I, 656; Corner, Wayside Trees of Malaya, p. 501, pl. 152, 153, fig. 168. *Syzygium polyanthum* (Wight) Walp., Repert., II, 180 (1843); Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 155. *Eugenia balsamea* Ridl., F.M.P., I, 754, non Wight. *E. Junghuhniana* Miq., Fl. Ind. Bat., I, i, 444 (1855). *E. nitida* Duthie in Hook. fil., F.B.I., II, 496 (1878). (Fig. 40*a*).

Widely distributed from Langkawi and Kelantan to Singapore, in lowland forest and secondary growth and in villages, commonest in the south of the Peninsula.
Distrib: Burma, Siam, Indo-China, Sumatra, Borneo, Java.

A rather slender *tree* up to c. 24 m. tall; bark creviced into small regular inconspicuous rectangular pieces, not or slightly flaky, rather thick, pale grey or whitish grey; inner bark thick, pink, turning mauvish on exposure; wood pale. *Twigs* terete, drying reddish brown or greyish brown, bark somewhat flaky. *Leaves* thinly coriaceous, narrowly elliptic, lanceolate, oblong elliptic or oblong oblanceolate, usually shortly and bluntly acuminate, sometimes caudate acuminate, base cuneate, from c. 7–16 cm. long and 2·5–7 cm. broad; upper surface drying dull or slightly shiny, dark brown to almost black, minutely punctate, dull below and brown or reddish brown, closely pellucid dotted in life, minutely black dotted or pustulate when dry; midrib impressed above, prominent below; *primary nerves* c. 7–11 pairs, 0·5–1 cm. or more apart, usually faint above, slightly prominent below and usually quite distinct, spreading or obliquely ascending, nearly straight or slightly curved to an intramarginal nerve 2–4 mm. from leaf margin; secondaries and reticulations usually faint or obscure; petiole usually c. 0·5 cm. long, rarely as much as 1 cm.

Panicles usually from the young twigs below the leaves, sometimes axillary, numerous, up to c. 5 cm. long but occasionally as much as 10 cm. long, peduncled or branched from near base, the rachis and short divaricate branches slender, 4-angled or compressed, bracts and bracteoles minute, subpersistent, triangular acute; *flowers* faintly fragrant, calyx greenish, petals and stamens white, sessile, usually in threes at the ends of the branches or of the short branchlets; *calyx* campanulate, narrowed into a short pseudostalk, tube c. 2 mm. long; lobes 4, green, broadly ovate rounded, c. 1·5 mm. tall, the two outer thinner and slightly larger than the two inner, conspicuously pellucid dotted; *petals* 4, free, thin, broadly ovate rotund, conspicuously pellucid dotted, c. 3 mm. across and 2·5 mm. tall, the two outer ones often retuse, quickly deciduous; *stamens* numerous, filaments subulate, gland dotted, up to c. 4 mm. long, anthers oblong ovate, c. 0·4 mm. long, connective gland small; *style* terete, narrowly conic, apex truncate, c. 2 mm. long; *ovary* 2-celled, multiovulate. After the petals fall the calyx opens out into a flat pinkish disc and the calyx lobes shrivel and turn pink.

Fruit green when full grown, ripening deep pink or dull dark scarlet to purple black, globose to depressed globose, c. 1·2 cm. diam., apical umbilicus shallow, 3–4 mm. diam., bearing on its margin the 4 enlarged persistent fleshy calyx lobes; pericarp c. 2 mm. thick, juicy and pulpy, whitish tinged pink, faintly sweet; seed depressed globose, c. 7 mm. diam., testa pale brown, thin, adhering to the green rugose and gland dotted surface of the cotyledons; cotyledons side by side, inner faces green, gland dotted, nearly plane, sessile, attached to the stout hypocotyle near periphery. Germination hypogeal.

E. polyantha Wight var. **sessilis** var. nov.
A typa floribus fasciculatis differt.

JOHORE: Sungai Kayu, in swampy forest, a tree 30–35 feet tall, *SFN 32413* (*Kiah*), TYPE collection, holotype in Herb. Singapore .

At first sight this looks different from the typical form, but the foliage and flowers conform and the only difference is in the entire absence of inflorescence rachis.

111. **Eugenia Koordersiana** King, Mat. F.M.P., No. 12, 128 (1901); Ridl., F.M.P., I, 732. (Fig. 40*b*).

PERAK: Larut, within 100 feet, *Kunstler 6208, 6385* (syntypes), 300–500 feet, *Kunstler 6233* (syntype); Pondok Tanjong, *Forest Dept. FMS 11792, 11798;* sine loc., *Scortechini s.n., 257* (syntype).
SELANGOR: sine loc., *Burn-Murdoch s.n.*
Distrib: Endemic.

A *tree* up to c. 24 m. tall. *Twigs* terete, smooth, blackish brown when dry. *Leaves* coriaceous, narrowly elliptic or narrowly ovate elliptic, rarely oblanceolate, apex

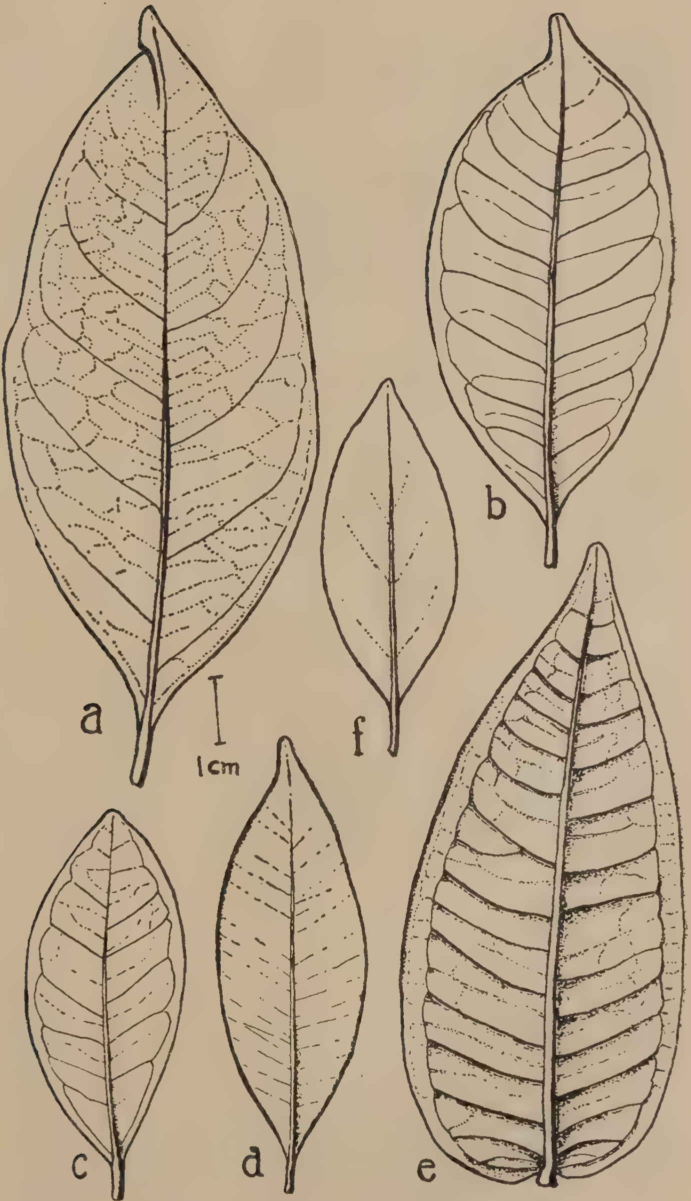

Fig. 40. a, *E. polyantha;* b, *E. Koordersiana;* c, *E. orites;* d, *E. alyxifolia;* e, *E. tetraptera* var. *pseudotetraptera;* f, *E. myriantha.*

shortly and abruptly acuminate, base cuneate, from c. 5 cm. × 2·5 cm. to 11 cm. × 5 cm., both surfaces drying very dark brown to blackish brown, the lower slightly paler; midrib impressed above, prominent below; *primary nerves* 8–14 pairs, impressed above, fine but slightly elevate and distinct below, curving up to a shallowly looped intramarginal nerve c. 2–4 mm. from leaf margin, with a very faint series of loops nearer the margin, reticulations invisible above, very slightly raised and rather indistinct below; petiole from c. 5 mm. to nearly 1 cm. long.

Panicles terminal or occasionally from upper leaf axils, often clustered, pedunculate, usually longer than the leaves, corymbose, with several pairs of spreading or obliquely ascending branches up to c. 4 cm. long, they and the rachis sharply or obtusely 4-angled with dark smooth bark; *flowers* white, sessile, in threes or fives at ends of branches or of short rather slender branchlets, buds clavate; *calyx* campanulate, c. 4 mm. long and 2 mm. across mouth, somewhat 4-angled, rather gradually contracted into a short not well defined pseudostalk; lobes 4, deep, broad, and rounded, c. 2 mm. across and 1·2 mm. tall, caducous; *petals* 4, probably falling as a calyptra, but free, more or less orbicular, 3·5–4 mm. diam.; *stamens* numerous, filaments slender, up to 5–6 mm. long, anthers broadly elliptic, c. 0·3 mm. long, connective gland distinct; *style* stouter than filaments, c. 6 mm. long; *ovary* 2-celled.

Merrill and Perry point out that *E. Koordersiana* is very closely allied to *Syzygium confertum* (Korth.) Merr. & Perry. I have seen only *Elmer 20126* of the specimens cited by Merrill and Perry and on the basis of this collection the two species are certainly very close, but *E. Koordersiana* has the primary nerves impressed above in all the material seen, and the branchlets have darker bark. It is better to keep the two species separate until *E. Koordersiana* is better known.

112. **Eugenia orites** Ridl., F.M.P., V (Suppl.), 308 (1925). (Fig. 40*c*).

JOHORE: Gunong Belumut, 3,000 feet, *SFN 10722* (*Holttum*), type collection.

A *tree*. *Twigs* rather slender, terete, bark smooth, drying greyish or blackish brown. *Leaves* thickly coriaceous, elliptic lanceolate, apex narrowed and blunt, base cuneate, up to c. 5·5 cm. × 2·5 cm., both surfaces drying reddish brown, dull, the upper minutely punctate; midrib narrowly impressed above, elevate below; *primary nerves* 4–7 pairs, 5–8 mm. apart, slightly raised and rather indistinct above, raised and distinct below, obliquely ascending to an intramarginal nerve 2–3 mm. from the more or less recurved leaf margin, reticulation obscure above, less distinct below than the primaries; petiole up to c. 7 mm. long, rather stout.

Cymes terminal, usually several together, or occasionally from upper leaf axils, up to c. 4 cm. long, rachis slender, angled and longitudinally wrinkled, drying dark, with three sessile flowers at its apex and often a pair lower down; *calyx* campanulate, c. 8 mm. long and 6 mm. across mouth after anthesis, narrowed gradually to a pseudostalk 2–3 mm. long; lobes 4, thick with thin margins, suborbicular, c. 4 mm. diam., quickly deciduous and leaving a truncate-undulate calyx limb; *petals* not seen; *stamens* with very slender filaments, c. 6 mm. long, anthers ovate, c. 0·5–0·6 mm. long, connective gland rather conspicuous; *style* much stouter than filaments, subulate, c. 6 mm. long; *ovary* 2-celled.

A little known plant only once collected, but distinct in the small leaves, cymose inflorescence with few rather large flowers and the large, quickly deciduous calyx lobes.

SFN 28907 (*Symington & Kiah*) from Gunong Tapis, Kuantan, Pahang, alt. 4,600 feet, may be this, but it has much larger leaves, a shorter inflorescence and somewhat larger flowers with longer styles.

113. **Eugenia alyxifolia** Ridl. in Journ. Bot., 296 (1924); F.M.P., V (Suppl.), 309 (1925). (Fig. 40*d*).

PAHANG: Fraser Hill, 4,000 feet, *SFN 11213* (*Nur*), type collection.

A *shrub*. *Twigs* slender, the youngest acutely 4-angled, bark drying dark, minutely rugulose pustulate, older twigs obtusely 4-angled or terete, bark drying smooth and yellowish or greyish. *Leaves* coriaceous, lanceolate or narrowly oblong lanceolate, apex shortly and bluntly acuminate, base narrowed, up to c. 7 cm. × 2·5 cm.; upper surface drying blackish brown, closely pitted, lower surface paler, reddish brown, minutely rugulose pustulate; midrib impressed above, prominent below and keeled towards the petiole; *primary nerves* 15–20 pairs, 3–5 mm. apart, almost invisible above, slightly raised and faint below, curving slightly to a very faint intramarginal nerve close to and hidden by the recurved leaf margin; petiole from 0·5–1 cm. long.

Panicles terminal, very short, c. 1 cm. long and 1·5–2 cm. across, sessile and branched from base, branches short, crowded, spreading, 4-angled; *flowers* white, sessile in threes at the ends of very short branchlets, buds narrowly obconic truncate, c. 3·5 mm. long; *calyx* after anthesis funnel shaped or somewhat campanulate, narrowed gradually to base, pseudostalk not sharply marked off; lobes 4, short, broad and rounded, obscure, incurved in bud; *petals* falling in a thick flat calyptra c. 1·5 mm. diam.; *stamens* less than 30, filaments stout, flattened below, reaching a little more than 1 mm. long, anthers ovate elliptic, c. 0·2 mm. long, connective gland distinct; *style* rather stout, narrowly conical, c. 1 mm. long; *ovary* 2-celled.

Collected only once, but distinct in the narrow leaves closely pitted above and in the very short inflorescences with very small flowers.

114. **Eugenia pseudocrenulata** nom. nov. (Fig. 41).

E. crenulata Duthie in Hook. fil., F.B.I., II, 490 (1878).; King, Mat. F.M.P., No. 12, 91; Ridl., F.M.P., I, 751; non Willd. (1800).

KEMAMAN: Bukit Kajang, 500 feet, *SFN 30456* (*Corner*), leaf specimens matching the type very closely.
PERAK: Kledang Saiong Forest Reserve, *Forest Dept. FMS 33754*, leaf specimens.
MALACCA: sine loc., *Maingay K.D. 739* (type collection).
SINGAPORE: Selitar, *Ridley 6232;* Mandai road, *SFN 28090* (*Corner*).
Distrib: Endemic.

A *tree* up to c. 12 m. tall, trunk slightly fluted and stilt rooted at base; bark entire, lenticellate or bumpy, or tesselately cracked in small patches, warm brown or greyish rufous; inner bark thick, deep pink brown or deep red brown, with dark brown gummy transversely elongate tannin cavities, very astringent; wood buff white. *Twigs* terete, bark drying brown and finely wrinkled. *Leaves* thickly coriaceous, stiff, dark green above and yellowish below in life, elliptic or elliptic rotund to narrowly oblong elliptic, apex rounded or somewhat narrowed with a short apiculus, or shortly and broadly acuminate, base cuneate, from c. 10–20 cm. long and 5–10 cm. broad, upper surface drying olivaceous to almost black, usually somewhat polished, often with large scattered gland pits, lower surface duller, reddish or dark brown, conspicuously dark gland dotted in life; midrib impressed above, prominent below and longitudinally wrinkled or keeled; *primary nerves* c. 30 pairs, usually c. 0·5 cm. apart, raised and distinct on both surfaces, more prominent below, obliquely ascending to a distinct intramarginal nerve 2–3 mm. from the shallowly and rather obscurely crenate leaf margin; secondaries and numerous reticulations almost as distinct on both surfaces as primaries; petiole stout, drying black and wrinkled, up to c. 2 cm. long.

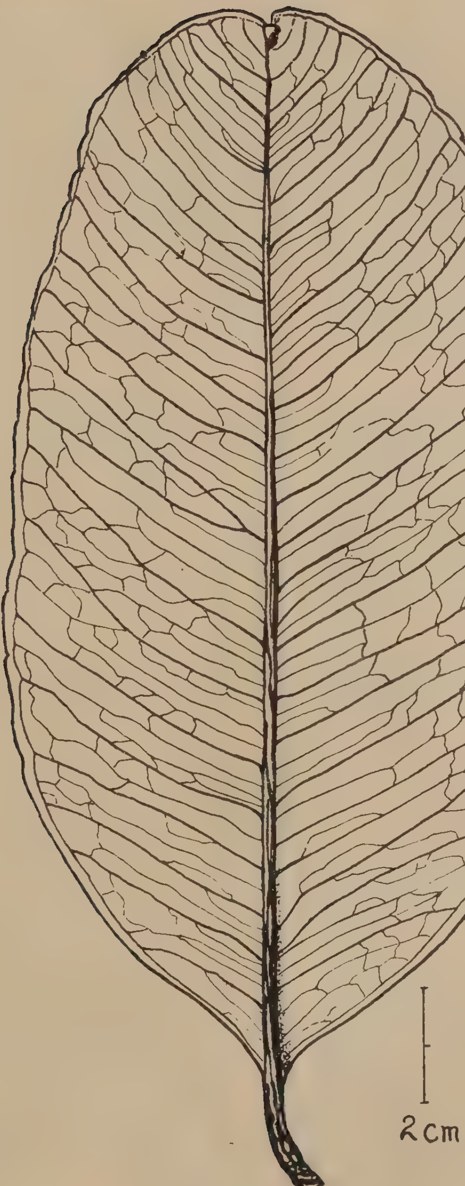

Fig. 41. *E. pseudocrenulata.*

Panicles terminal, up to c. 18 cm. long, on long peduncles, corymbose, trichotomous, peduncles and branches rather slender, obtusely 4-angled, bracts and bracteoles subpersistent, minute, narrowly triangular acute; *flowers* numerous, sessile in threes at the ends of the short ultimate branchlets; *calyx* after anthesis funnel shaped or narrowly campanulate, c. 4 mm. long and 3 mm. across mouth, tapered to base and rather suddenly contracted into a short pseudostalk c. 1 mm. long; lobes apparently 4, large and rounded, thin, quickly deciduous; *petals* falling in a thick gland dotted calyptra c. 3 mm. diam.; *stamens* numerous, filaments slender, c. 4 mm. long, anthers broadly ovate elliptic c. 0·4 mm. diam., connective gland distinct; *style* much stouter than filaments, c. 3·5 mm. long; *ovary* 2-celled, multiovulate.

Fruit ripening pallid watery white, depressed globose, c. 1 cm. long and 1·5–1·75 cm. across, apical umbilicus c. 2 mm. diam., the calyx rim not prominent; pericarp c. 2–3 mm. thick; seed c. 0·75 cm. long and 1 cm. wide, more or less conforming to shape of fruit but slightly compressed laterally; testa rather thin, leathery crustaceous, not membranous, adhering closely to cotyledons; cotyledons juxtaposed, nearly equal, their surfaces smooth with distant conspicuous dark gland dots, inner faces nearly plane, similarly gland dotted, attached to hypocotyle near their centres by very short broad stalks.

A little known species which seems to be very distinct in its large stiff crenate leaves with the venation raised on both surfaces, and in the large panicles of small flowers.

115. **Eugenia tetraptera** (Miq.) comb. nov. (Fig. 42).

Jambosa tetraptera Miq., Fl. Ind. Bat., Suppl. I, 311 (1860–62).

SELANGOR: Sungai Buloh Forest Reserve, *Ridley 13345, Forest Dept. FMS 2283, 27135, 29791.*

Distrib: Sumatra (Penasa, Siak, *Ridley 8987*), Bangka (type).

A ?*tree. Twigs* slender, the youngest quadrangular with short coarse rufous glandular hairs, the angles with very conspicuous very wavy membranous wings, older twigs terete with pale flaky bark. *Leaves* thinly coriaceous, narrowly ovate or ovate oblong or ovate lanceolate, apex shortly and bluntly acuminate, base rounded and minutely cordate, 4 cm. × 2 cm. to 7 cm. × 3·5 cm.; upper surface drying dark brown, somewhat polished, minutely and closely punctate, lower surface reddish brown; midrib deeply impressed above, prominent below and conspicuously tuberculate, especially towards base; *primary nerves* c. 10

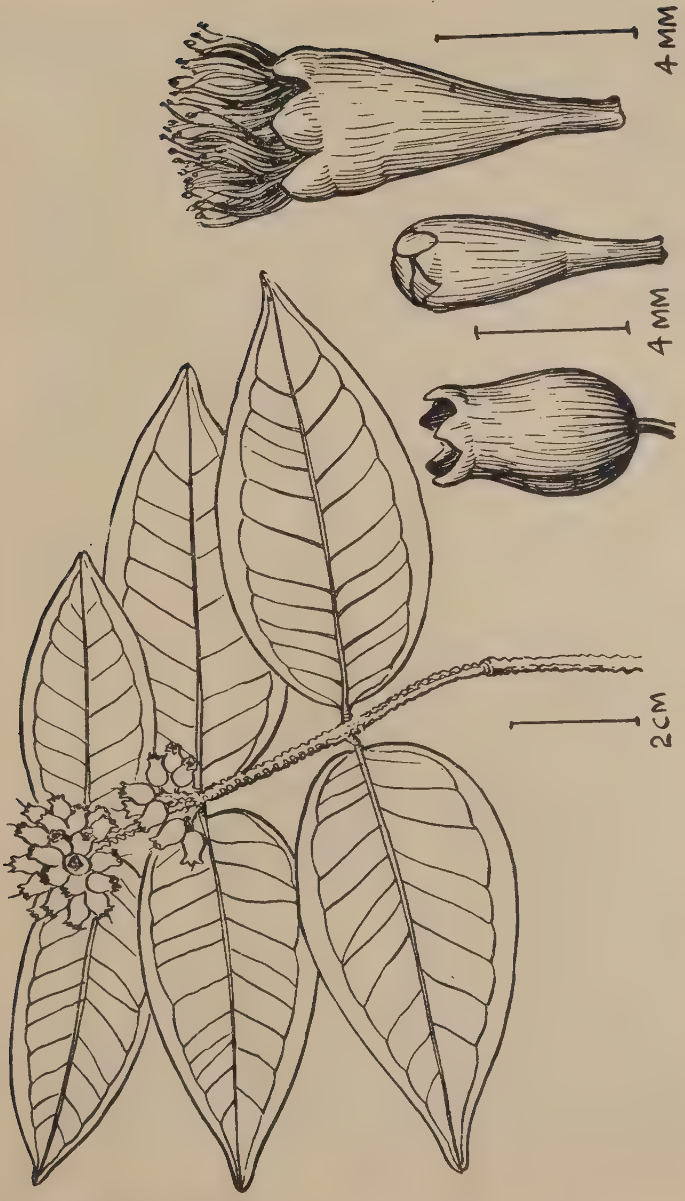

Fig. 42. *E. tetraptera.*
Del: Chan York Chye.

pairs, impressed above and very distinct, prominent below, almost straight or curving slightly to a prominent shallowly looped intramarginal nerve 3–4 mm. from leaf margin, with a much less prominent series of loops c. 1 mm. from margin; reticulations invisible above, slightly raised and broad below, much less distinct than primaries; petiole very short, stout, closely wrinkled-tuberculate.

Flowers sessile, in terminal or axillary pseudo-umbellate sessile or almost sessile heads reaching c. 2 cm. diam., closely crowded and bracteate, the bracts not very conspicuous, subpersistent, linear oblong, keeled, c. 3 mm. long; *calyx* narrowly cylindric funnel shaped, 7–8 mm. long, c. 3 mm. across mouth, glaucous and longitudinally wrinkled, rather abruptly narrowed at base into a slender pseudostalk c. 2–3 mm. long; lobes 5, conspicuous, persistent, oblong ovate blunt, about 1 mm. across and 1 mm. tall; *petals* falling in a calyptra c. 2·5 mm. diam.; *stamens* numerous, filaments very slender, up to c. 6–7 mm. long, anthers ovate, 0·2–0·3 mm. long, connective gland large and conspicuous; *style* much stouter than filaments, c· 8 mm. long; *ovary* 2-celled.

E. tetraptera (Miq.) Henderson var. **pseudotetraptera** (King) var. nov. *Eugenia pseudotetraptera* King, Mat. F.M.P., No. 12, 109 (1901) ; Ridl., F.M.P., I, 739. (Fig. 40*e*).

PAHANG: Cameron Highlands, 5,000 feet, *SFN 18050* (*Henderson & Whitty*), *Forest Dept. FMS 31018;* Sungai Bertam, Cameron Highlands, *Forest Dept. FMS 36265;* Fraser Hill, *Forest Dept. FMS 45413.*

JOHORE: Gunong Panti, 1,600 feet, *Ridley 4197*, TYPE collection of *E. pseudotetraptera* King and of var. *pseudotetraptera*, holotype in Herb. Singapore; Sungai Kayu, Mawai-Jemaluang road, *SFN 32018* (*Corner*); Sungai Sedili, *Corner s.n.*

Distrib: Karimon Islands (*Ridley 348*).

King remarks that his species is very near *Jambosa tetraptera* Miq., and I do not think it can be held to be more than a variety. King, of course, did not see the Sungai Buloh specimens here placed under Miquel's species. The variety differs from the type only in the much more conspicuous and persistent bracts, and in the absence of the rufous glandular hairs on the young stems and of the tuberculations on the midrib of the leaf below.

The *fruit* is c. 7–8 mm. diam., globular, crowned by the short wide calyx rim and lobes; seed 1, globular, cotyledons side by side, nearly equal, conspicuously gland dotted, inner faces folded and excavate, attached near their centres to the large hypocotyle which reaches the periphery of the seed.

The specimens from Sungai Buloh cited above under Miquel's species are a close match for a sheet of *Teysmann 3307* preserved in Herb. Calcutta, which is doubtless part of the type collection. *Ridley 13345* has the pseudo-umbellate inflorescence of the type, but the other specimens show a tendency to a paniculate inflorescence which may be due simply to the dropping of the leaves in the axils of which the inflorescences arise, along with a tendency to produce the inflorescences on short peduncles. The typical form of the variety has the flowers in sessile glomeruli, but in other specimens the inflorescence is pseudo-paniculate, again apparently due to the dropping or suppression of leaves and development of short peduncles. This creates an inflorescence very similar to that of *E. polita* King.

Syzygium pterophorum Merr. & Perry in Mem. Amer. Acad. Arts and Sci., XVIII, 3, 158 (1939), of which I have seen a duplicate of *Clemens 31300* (cited in the original description) and *SFN 27096* (*Carr*) is very close to *E. tetraptera* var. *pseudotetraptera*, differing only in the pustulate, not glaucous and longitudinally wrinkled calyx tube, the shorter pseudostalk, and possibly in the more quickly deciduous bracts.

116. **Eugenia polita** King, Mat. F.M.P., No. 12, 110 (1901); Ridl., F.M.P., I, 739; Corner, Wayside Trees of Malaya, p. 501, fig. 168. (Fig. 43*a*, *b*, *c*).

KEDAH: Jerai Forest Reserve, *Forest Dept. FMS 17932;* Kedah Peak, 3,000 feet, *Ridley 5208.*

PENANG: sine loc., *Wallich 3626;* Government Hill, 1,200 feet, *Curtis 511* (syntype).

PERAK: sine loc., *Scortechini s.n.*, *Wray 2822* (syntype); Haram Parah, *Scortechini 585* (syntype); Larut, 2,500–3,000 feet, *Kunstler 6903* (syntype); near Ulu Kerling, 400–600 feet, *Kunstler 8679* (syntype); Gopeng, 500–1,000 feet, *Kunstler 5780.*

SELANGOR: Bukit Cheraka Forest Reserve, *Forest Dept. FMS 13023.*

MALACCA: Sungai Udang, *Holmberg 859* (syntype, cited by King as Ridley's number).

PAHANG: Kuantan, *Forest Dept. FMS 6682;* Fraser Hill, 4,000 feet, *SFN 33207* (*Corner*).

JOHORE: Kuala Sembrong, *Lake & Kelsall 4078* (syntype, cited by King as Ridley's number); Kukub, *Forest Dept. FMS 6057;* Pulau Setindan, near Mersing, *SFN 29769* (*Corner*).

Distrib: Endemic.

Usually a *shrub* or small *tree* but reaching 24–25 m. tall; bark thinly flaky, rufous orange. *Twigs* slender, acutely 4-angled, more or less winged, the wings sometimes broad and wavy, bark drying pale brown, smooth or flaky. *Leaves* coriaceous or thickly coriaceous, narrowly lanceolate to ovate lanceolate, apex acuminate, sometimes shortly and bluntly, sometimes caudate acuminate, base broadly cuneate or rounded, variable in size, from c. 4·5 cm. × 1·75 cm. to c. 9 cm. × 3·5 cm. or 6 cm. × 3·5 cm., both surfaces shining when dry, the upper liver brown to blackish brown, more or less punctate, lower surface paler and more reddish brown, with scattered black dots; midrib impressed above, usually raised below, sometimes nearly flat; *primary nerves* up to c. 14 pairs, spaced, faint or invisible above, sometimes raised below and quite distinct, sometimes obscure or almost invisible, meeting in an obscure intramarginal nerve close to the leaf margin; petiole very short, drying black and wrinkled.

Panicles axillary and terminal, shorter than the leaves, condensed, usually not more than c. 2–3 cm. long, branches and rachis rather stout, 4-angled and more or less winged, bark drying pale brown and smooth, bracts persistent, very numerous and conspicuous, those at base of panicle narrow with long subulate points, c. 3 mm. long, those subtending the branches oblong ovate or obovate, rounded, conspicuously gland dotted, c. 4 mm. long and 3·5 mm. broad, those subtending the flowers from broadly oblong to linear oblong, blunt, 4–5 mm. long; *flowers* sessile, the bracts overtopping them at least in bud, *calyx* cylindric-funnelshaped, c. 5 mm. long and 3 mm. across mouth, contracted at base into a very short pseudostalk, tube slightly wrinkled; lobes 5, conspicuous, persistent, erect, broadly ovate rounded, c. 1·2 mm. across and 1 mm. tall; *petals* calyptrate; *stamens* c. 2 mm. long, filaments slender, anthers oblong ovate, 0·4–0·5 mm. long, connective gland distinct; *ovary* 2-celled.

Fruit greenish white with very fine dark mottling, more or less globose or ovoid globose, 8–9 mm. long and 7–8 mm. across, crowned by the calyx rim c. 1 mm. high and 2 mm. across, bearing the erect slightly incurved enlarged calyx lobes c. 2 mm. tall, ?falling when the fruit is fully ripe; pericarp thin, testa dark brown; seed black, nearly globose or slightly oblong globose, 6–7 mm. diam., surface of cotyledons slightly mucilaginous and minutely pitted; cotyledons intense purple, side by side, commissure wavy; inner faces interlocking, point of attachment hidden under fold, hypocotyle large, more or less warty, terete, reaching periphery of seed.

117. **Eugenia tecta** King, Mat. F.M.P., No. 12, 109 (1901); Ridl., F.M.P., I, 739. (Fig. 43*d*, *e*).

PERAK: Larut, within 100 feet, *Kunstler 1863* (type collection); Bukit Blakang Parang, near Gunong Bintang, *SFN 21068* (*Haniff*).
Distrib: Endemic.

A small *tree*. *Twigs* slender, acutely 4-angled, the youngest parts narrowly winged on the angles, bark drying dark brown, smooth, becoming flaky. *Leaves* thinly coriaceous, ovate lanceolate to oblong lanceolate or oblong ovate, apex acuminate, base rounded and more or less cordate, up to c. 9·5 cm. long and 4 cm. broad; both surfaces drying pale brown or pale reddish brown, the upper slightly darker, somewhat polished, sparsely punctate, the lower dull, minutely and sparsely dark gland dotted; midrib impressed above, elevate below, with small scattered tubercles; *primary nerves* numerous (about 20 pairs), very slightly raised and very faint on both surfaces, invisible in some leaves, nearly horizontal and curving up to an obscure nearly straight intramarginal nerve 1–2 mm. from leaf margin; petiole 2–4 mm. long, densely tuberculate, drying black.

Flowers "golden", crowded in terminal or axillary fascicles, sessile, bracteoles small and subpersistent; *calyx* wrinkled and subglaucous when dry, funnel shaped, 10–11 mm. long and 4 mm. across mouth, tapered to base and contracted into a slender pseudostalk 1·5–3 mm. long; lobes 5, persistent, erect, ovate triangular subacute, c. 2 mm. across and 1·5 mm. tall; *petals* 5, free, ovate orbicular, with large pellucid gland dots, c. 4 mm. diam·; *stamens* numerous, filaments slender, up to c. 8 mm. long, anthers oblong, c. 0·5 mm. long connective gland large and conspicuous.

Fruit globular, 7–8 mm. diam., with large scattered pellucid gland dots, apical umbilicus wide and rather deep, fringed by the erect, slightly enlarged calyx lobes; seed globose, c. 6 mm. diam., cotyledons superposed, nearly equal, commissure wavy, inner faces gland dotted, deeply excavate and folded, attached near their centres by short broad stalks to the very large angled and warted hypocotyle which reaches the periphery of the seed and is there truncate and broadened.

118. **Eugenia jasminifolia** Ridl. in Journ. F.M.S. Mus., X, 133 (1920); F.M.P., I, 740. (Fig. 43*f*).

KELANTAN: Sungai Keteh, *SFN 11993* (*Nur*); Gunong Sitong, *Forest Dept. FMS 37751*.
TRENGGANU: sine loc., *Forest Dept. FMS 26910*.
PERAK: Kledang Saiong, *Forest Dept. FMS 25795*.
MALACCA: base of Gunong Mering, *Ridley 3299*.

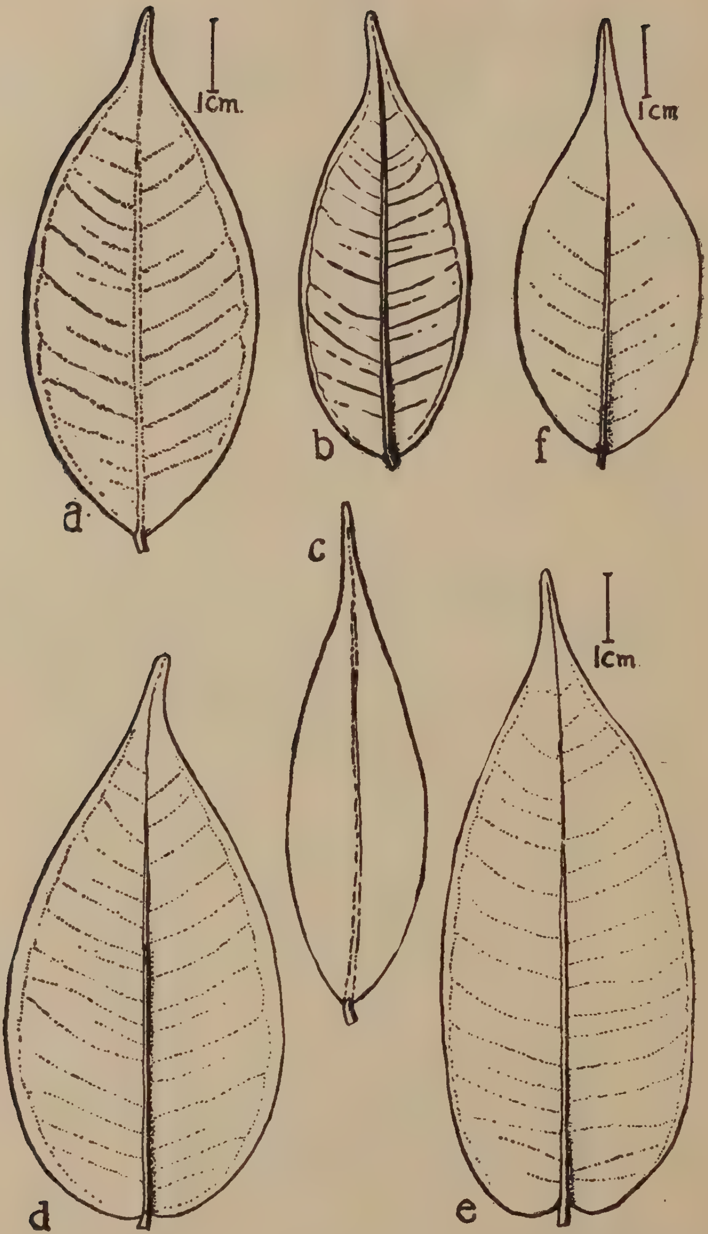
a
b
c
d
e
f
1cm
1cm
1cm

Fig. 43. a, b, c, *E. polita;* d, e, *E. tecta;* f, *E. jasminifolia.*

NEGRI SEMBILAN: Gunong Tampin, *Ridley s.n.;* Gemas, *SFN 4976* (*Burkill*); Ulu Rembau, *SFN 11775* (*Nur*).

PAHANG: Bukit Kajang, Raub, *Forest Dept. FMS 20405;* Ulu Serau, *Forest Dept. FMS 28233, 28335.*

Distrib: Endemic.

A small bushy *tree*. *Twigs* very slender, the youngest acutely or obtusely 4-angled, older ones terete, drying smooth and pale brown. *Leaves* thinly coriaceous, lanceolate to ovate lanceolate, apex acuminate or caudate acuminate, base cuneate or narrowed and minutely rounded, from c. 2·5 cm. × 1 cm. to c. 6 cm. × 2·5 cm., both surfaces drying pale brown to reddish brown, the upper darker, polished and punctate, lower dull, with scattered black dots; midrib impressed above, elevate below, with distant pustulations; *primary nerves* about 10 pairs, usually very faint or invisible on both surfaces, occasionally slightly raised below; petiole drying black and wrinkled, up to c. 4 mm. long but usually shorter.

Flowers sessile in dense axillary and terminal sessile heads c. 1 cm. across, with numerous narrowly oblong acute papery keeled bracts longer than the flowers, dropping after the flowers open; *calyx* narrowly funnel shaped, c. 6 mm. long and 3–4 mm. across mouth after anthesis, longitudinally wrinkled, gradually narrowed to base and there contracted into a short pseudostalk 0·5–1 mm. long; lobes 5, persistent, erect, glandular pustulate, ovate triangular, c. 1·5 mm. across and 1·5 mm. tall; *petals* free (?falling as a calyptra), orbicular, conspicuously glandular pustulate, c. 1·2 mm. diam.; *stamens* numerous, filaments slender, flattened, up to c. 7 mm. long, anthers elliptic oblong, c. 0·4 mm. long, connective gland distinct; *style* stout, terete, c. 9 mm. long; *ovary* 2-celled.

Fruit globular, greenish or white when ripe, c. 8 mm. diam., smooth, minutely and closely glandular, apical umbilicus shallow, c. 3 mm. diam., fringed by the erect calyx lobes; pericarp thin; seed 1, globose or somewhat reniform, testa rather papery, adhering closely to the smooth conspicuously gland pitted surface of the cotyledons; inner faces conspicuously gland dotted, excavate and folded, the hypocotyle large, quadrangular, gland dotted, almost concealed in a fold of one cotyledon, reaching periphery of seed and there expanded and truncate.

The four preceding species, *E. tetraptera*, *E. polita*, *E. tecta* and *E. jasminifolia* form a group of closely related species which tend to overlap in a confusing manner. Of none of them is there abundant material and further collections may show that too many species have been made.

They may be distinguished as follows:—

Bracts conspicuous, as long as flowers:
  Flowers in sessile heads:
    Leaves more or less nerveless, narrowed to base *jasminifolia*.
    Leaves with raised nerves below, bases rounded, usually more or less cordate *tetraptera* var. *pseudotetraptera*.
  Flowers in condensed panicles:
    Leaves lanceolate, usually narrowed to base *polita*.
    Leaves with broad, rounded, more or less cordate bases . *tetraptera* var. *pseudotetraptera*.
Bracts small or absent:
  Leaves with very faint nerves, midrib below very slightly tuberculate or smooth *tecta*.
  Leaves with conspicuous raised nerves below, midrib conspicuously tuberculate · *tetraptera*.

The flowers of the four species are all of the same type, having a narrowly funnel shaped calyx with persistent lobes, but those of *E. tecta* are larger than those of the other three.

The following collection, which belongs in this group, has not been placed. It appears to connect *E. jasminifolia* with *E. tecta*. It has a sessile bracteate inflorescence but the flowers are larger than in *jasminifolia* and approach those of *tecta*. The leaves are thicker and larger than those of *jasminifolia*, rounded and minutely cordate at base, without black dots:—

JOHORE: Gunong Belumut, 3,000 ft., *SFN 10820* (*Holttum*).

119. **Eugenia nitidula** Ridl., F.M.P., V (Suppl.) 308 (1925). (Fig. 44*a*, *b*).

PERAK: Gunong Inas, 5,000 feet, *Wray 4114, 4115.*
PAHANG: Fraser Hill, 4,000 feet, *SFN 8677* (*Burkill & Holttum*), type collection; Cameron Highlands, c. 5,000 feet, *SFN 18039* (*Henderson & Whitty*); Jasar, Cameron Highlands, *Forest Dept. FMS 27309;* Gunong Berumban, Cameron Highlands, *Forest Dept. FMS 31010;* Gunong Lesong, Kuantan, *Forest Dept. FMS 4157.*
Distrib: Endemic.

A *bush* or bushy *tree* up to c. 15 m. tall; bark entire, rather rough and bumpy, reddish or greyish brown. *Twigs* slender, the youngest acutely 4-angled, bark drying smooth and pale brown, older ones obtusely 4-angled or terete with slightly flaky dark brown bark. *Leaves* small, stiff, thickly coriaceous, elliptic lanceolate to ovate lanceolate, or almost ovate, apex more or less acuminate, base broadly cuneate or rounded, from c. 2 cm. × 0·75 cm. or even smaller to c. 3·5 cm. × 2 cm., upper surface drying leaden brown to dark reddish brown, shining, sparsely and minutely punctate or black dotted, lower surface pale reddish brown, dull; midrib impressed above, elevate below; *primary nerves* about 10 pairs, slightly raised and very faint or invisible above, raised below but usually not very distinct, joining an obscure intramarginal nerve close to the recurved leaf margin; reticulations when visible almost as distinct as primaries; petiole up to c. 3 mm. long but often less than 1 mm., drying black and wrinkled.

Flowers sessile in terminal and axillary small rather few flowered bracteate tufts, bracts numerous, persistent, lanceolate acuminate to linear oblong; *calyx* cylindric funnel shaped, slightly ribbed and obscurely pustulate, c. 4·5 mm. long and 2·5 mm. across mouth, tapered slightly at base into an exceedingly short and obscure pseudostalk; lobes 4, persistent, spreading-erect after anthesis, broadly ovate rounded, c. 1·3 mm. across and a little more than 1 mm. tall; *petals* calyptrate; *stamens* numerous, filaments slender, c. 2–3 mm. long, anthers elliptic ovate, c. 0·2 mm. long, connective gland distinct; *style* stouter than filaments, terete, c. 8 mm. long; *ovary* 2-celled.

This species is closely allied to *E. bankensis* (Hassk.) Backer (*Syzygium bankense* (Hassk.) Merr. and Perry), but differs in the larger, acuminate leaves, the less crowded flowers with less glaucous calyces and in being a mountain, not a lowland plant.

120. **Eugenia clypeolata** Ridl. in Journ. Roy. As. Soc. Str. Br., LXXXII, 185 (1920); F.M.P., I, 754. (Fig. 44*c*).

PAHANG: Slopes beyond Teku river, Gunong Tahan, *Ridley 16022* (type collection).
Distrib: Endemic.

A *bush*, youngest *twigs* slender, acutely 4-angled, smooth, bark drying pale brown, older twigs stout, terete, with slightly flaky greyish or brownish bark. *Leaves* very stiff and coriaceous, crowded, ovate or elliptic ovate, slightly narrowed to the blunt or retuse apex, base rounded and minutely cordate, c. 2 cm. × 1·5 cm., upper surface somewhat polished, drying olivaceous brown to blackish brown above, lower surface dull, reddish brown; midrib narrowly impressed above, slightly elevate or almost flat below; *primary nerves* about 8 pairs, very obscure on both surfaces or almost invisible, slightly impressed above, very slightly raised below, the intramarginal nerve sometimes more distinctly impressed above than the rest of the venation, usually very obscure below; petiole very short and stout, c. 2 mm. long, transversely wrinkled.

Panicles terminal, usually more or less hidden by the leaves, not more than about 1·5 cm. long, densely flowered, the rachis and one pair of very short, stout branches acutely 4-angled with pale yellowish brown bark; *flowers* sessile, in threes or clusters at ends of branches; *calyx* cylindric funnel shaped, c. 5 mm. long and 2·5–3 mm. across mouth, tapering slightly to base and there contracted into a pseudostalk of varying length, from almost none to c. 1·5 mm., tube ribbed, obscurely and minutely pustulate especially towards apex; lobes 5, persistent, erect-spreading, broad and rounded, distinctly glandular pustulate, c. 1·5 mm. across and 1 mm. tall, margins thin; *petals* falling in a hemispherical calyptra c. 3 mm. diam.; *stamens* numerous, filaments slender, up to c. 4 mm. long, anthers broadly oblong, 0·4–0·5 mm. long, connective gland distinct; *style* much stouter than filaments, subulate, 4–5 mm. long; *ovary* 2-celled.

Known only from one collection. Differs from *E. Stapfiana* in the broader leaves and the much less distinctly pustulate calyx tube.

121. **Eugenia Stapfiana** King, Mat. F.M.P., No. 12, 119 (1901); Ridl., F.M.P., I, 753. (Fig. 44*d, e*).

TRENGGANU: Gunong Padang, 4,000 feet, *SFN 31080* (*Moysey & Kiah*).

KELANTAN: Gunong Sitong, 6,000 feet, *Jupe s.n.*, *Forest Dept. FMS 37696*.

PERAK: Wray's Berumban, c. 7,000 feet, *Wray 1582* (syntype); Gunong Batu Puteh, 4,500 feet, *Wray 216, 1619* (syntypes); Gunong Korbu, 4,500 feet, *Robinson s.n.*, 5,500–7,000 feet, *Forest Dept. FMS 32103, 32215;* sine loc., *Scortechini 336* (syntype).

SELANGOR: Ulu Semangkok, *Ridley 12104;* Gunong Ulu Kali, 5,812 feet, *Forest Dept. FMS 343*.

PAHANG: Gunong Tahan, 6,000 feet, *Corner s.n.;* Cameron Highlands, 4,000 feet, *FMS Mus. 11696* (*Henderson*); Gunong Irau, summit, *Forest Dept. FMS 36564;* Pinetree Hill, Fraser Hill, *Corner s.n., Forest Dept. FMS 29488;* Gunong Tapis, Kuantan, 4,600 feet, *SFN 28846* (*Symington & Kiah*).

Distrib: Endemic.

A *shrub* or small *tree* up to c. 8 m. tall; bark smooth, not flaky, brownish grey, fuscous. Youngest *twigs* slender, acutely 4-angled with smooth brown bark when dry, older ones obtusely 4-angled or terete with greyish or brownish more or less flaky bark. *Leaves* small, thickly coriaceous,

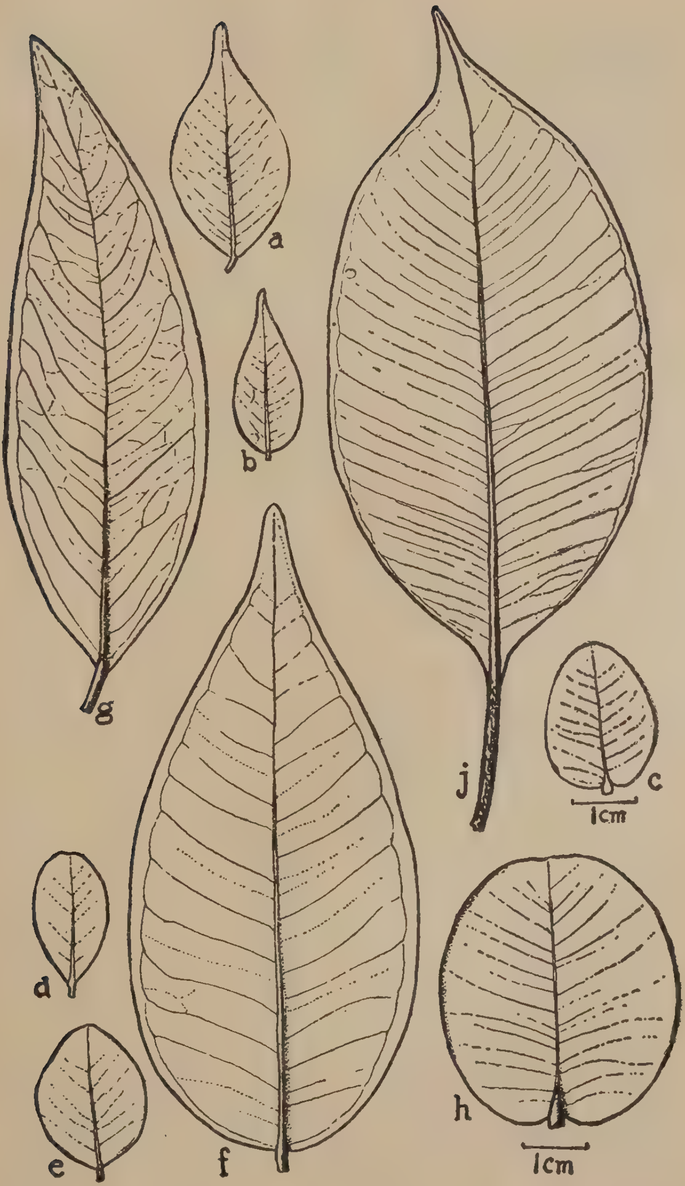
a
b
g
j
c
1cm
d
e
f
h
1cm

Fig. 44. a, b, *E. nitidula;* c, *E. clypeolata;* d, e, *E. Stapfiana;* f, *E. spicata;* g, *E. grata;* h, *E. spissifolia;* j, *E. leucoxylon.*

rigid, broadly lanceolate to elliptic or ovate, tapering to the broad blunt subacute or rounded and sometimes retuse apex, base broadly cuneate or rounded, from c. 1·5 cm. to 2 cm. long and 0·75 cm. to 1·5 cm. broad; upper surface drying olivaceous brown to blackish brown, shining, more or less scattered-punctate, lower surface reddish brown, dull; midrib impressed above, flat or slightly elevate below; *primary nerves* 7–8 pairs, usually almost or quite invisible above, sometimes slightly raised below and faint, or invisible; leaf margin recurved; petiole stout, very short, drying black and wrinkled, usually less than 3 mm. long.

Panicles terminal, short, scarcely exceeding the leaves, rather densely flowered, the short branches stout, 4-angled with conspicuous wavy wings; *flowers* sessile or very shortly and stoutly pedicellate, subtended by small subpersistent bracteoles; *calyx* narrowly funnel shaped or narrowly campanulate after anthesis, 5–6 mm. long, 2·5–3 mm. across mouth, gradually tapered to base and contracted into a short pseudostalk up to c. 1·5 mm. long, longitudinally ribbed and conspicuously coarsely pustulate; lobes 5, erect, persistent, broadly ovate rounded, thick textured with thin margins, 1·5–2 mm. across and c. 1 mm. tall; *petals* falling as a calyptra, partially agglutinated or free, orbicular, sparsely gland dotted, c. 2.5 mm. diam.; *stamens* numerous, filaments slender, up to c. 8 mm. long, anthers ovate, c. 0·5 mm. long, connective gland conspicuous; *style* stout, subulate, 5–6 mm. long; *ovary* 2-celled.

Fruit white, globular, c. 5 mm. diam., wrinkled and glandular pustulate when dry, apex crowned by the short wide calyx rim c. 3 mm. diam., bearing the erect enlarged calyx lobes; seed 1, somewhat reniform, surfaces of cotyledons smooth and pitted; cotyledons nearly equal, inner faces folded and excavate, attached near the periphery to the large quadrangular gland dotted hypocotyle which reaches the surface of seed.

A common species on the summits and ridge tops of the higher hills which I believe to be closely related to *E. spicata* var. *tenuiramis*, of which it might even be considered an extreme form. It differs, however, in the much shorter thicker leaves not caudate acuminate, and in the shorter inflorescences and shorter pseudostalk. The shape of the calyx tube is very close to that of *E. spicata* and it has similar pustulations. Another ally is *E. kinabaluensis* Stapf from Mt. Kinabalu in Borneo, which has more rotund retuse leaves and a smooth calyx tube. *E. nitidula* Ridl. is also very similar, but this has acuminate leaves and a smooth calyx tube.

122. **Eugenia spicata** Lamk., Encycl. Bot., III, 201 (1789); Corner, Wayside Trees of Malaya, p. 503, pl. 154. *Myrtus zeylanica* Linn., Sp. Pl., 472 (1753). *Syzygium zeylanicum* (L.) DC., Prodr., III, 260 (1828); Merr. & Perry in Journ. Arn. Arb., XIX, 101, 224; Mem. Amer. Acad. Arts & Sci., XVIII, 3, 159. *Eugenia zeylanica* Wight, Ill., II, 15 (1841); Duthie in Hook. fil., F.B.I., II, 485; King, Mat. F.M.P., No. 12, 108; Ridl., F.M.P., I, 738; non Willd. (1800). (Fig. 44*f*).

Common in the lowlands from Kedah and Trengganu to Singapore, usually by seashores and rivers but also in forest and secondary growth.

Distrib: India, Ceylon, Burma, Indo-China, China, Siam, Malaysia.

A *bush* or small straggly *tree* reaching c. 9 m. tall; bark thinly papery flaky, rufous orange, inner bark very thin, pale fawn. *Twigs* slender, obscurely 4-angled or terete with pale brown or greyish or reddish brown bark. *Leaves* coriaceous, lanceolate, elliptic lanceolate or ovate lanceolate, apex bluntly or acutely acuminate, base broadly cuneate or rounded, from c. 4 cm. to 9 cm. long and 1·5 cm. to 4 cm. broad; upper surface shining, drying brown to dark reddish brown, black dotted or punctate, lower surface paler and duller with minute scattered darker glands; midrib impressed above, slightly elevate or flat below; *primary nerves* 10–14 pairs, 2–4 mm. apart, usually finely impressed above and faint or almost invisible, very fine and raised below, distinct or obscure, curving up rather irregularly to a fine intramarginal nerve 1–1·5 mm. from leaf margin; secondaries and reticulations rather faint and obscure; petiole short, slender, drying black, up to c. 4 mm. long.

Panicles terminal and axillary, crowded, the axillary ones usually shorter than the leaves, the terminal ones often longer, branches and rachis slender, 4-angled, drying pale, the branches short or long, sometimes none; *flowers* faintly fragrant, white, sessile in threes or clusters on the rachis, at the ends of the branches, or at ends of the very short ultimate branchlets; *calyx* cylindric-funnel-shaped, c. 6 mm. long and 2–2·5 mm. across mouth, conspicuously and coarsely pustulate, constricted at base into a slender pseudo-stalk reaching c. 4 mm. long; lobes 5, erect, persistent, broadly ovate rounded, a little less than 1 mm. tall; *petals* falling in a hemispherical calyptra c. 2·5 mm. diam., sparsely gland dotted; *stamens* numerous, filaments slender, up to c. 8 mm. long, anthers oblong elliptic, c. 0·4 mm. long connective gland conspicuous; *style* stouter than filaments, c. 8 mm. long; *ovary* 2-celled.

Fruit oblong or oblong globose, white, c. 5–7 mm. long, apex deeply and narrowly excavate, with the erect or incurved calyx lobes; pericarp pithy, sweet; seed 1, greenish, cotyledons nearly equal, inner faces folded and excavate, the hypocotyle large, reaching periphery of seed.

E. spicata Lamk. var. **tenuiramis** (Miq.) var. nov.

Jambosa tenuiramis Miq., Fl. Ind. Bat. I, i, 437 (1855), loc. cit., Suppl. I, 311. *Eugenia longicauda* Ridl. in Journ. Roy. As. Soc. Str. Br., LXI, 7 (1912); F.M.P., I, 752. *E. nitidissima* Merr. in Philipp. Journ. Sci., X, 213 (1915).

PAHANG: Kluang Terbang, Gunong Benom, 5,000 feet, *Barnes 10869* (type collection of *E. longicauda* Ridl.).

JOHORE: Gunong Belumut, 2,500 feet, *SFN 10790* (*Holttum*), leaf specimens only; Gunong Panti, in ridge forest on summit, 1,600 feet, *Corner s.n.*, *SFN 32217* (*Corner*), *Forest Dept. FMS 35755.*

Distrib: Sumatra, Philippines.

I have seen several sheets, preserved in Herb. Calcutta, of Teysmann's collection from Sumatra, "ad littora Siboga", which is quoted by Miquel. These match very closely the type of *E. longicauda* Ridl., and also the type of *E. nitidissima* Merr., the latter differing only in the paler and rather broader leaves and in the strongly angled youngest shoots. These angled shoots are present in only one of the Malay Peninsular collections, but it seems probable that the very young shoots quickly lose their angles and become terete. *SFN 10790* from Gunong Belumut is sterile but otherwise a close match for Teysmann's specimens.

The variety differs from the typical form only in the narrower, longer, long caudate-acuminate leaves, which are usually thicker in texture. There is a very considerable range of variation in size and shape of leaves in the typical form and narrow long caudate leaves are often found along with the normal broader blunter leaves on the same individual. The variety appears never to have the broad leaves of the typical form.

King has written up the sheets of Teysmann's collection in Herb. Calcutta as *E. zeylanica* Wight. There may be no justification for maintaining the variety, but it looks very different and in Malaya at least has a different habitat from the typical form.

The type of *Jambosa tenuiramis* Miq., which I have not seen, came from "Onder-Tapanoeli", Sumatra, and in Miquel there is no indication at what altitude above sealevel it was collected. Teysmann's collection from Siboga is from the coast, and this is the normal habitat of *E. spicata*. All the

Malayan collections and the Philippine collection of the variety come from forested ridges from about 1,000 feet upwards.

True *E. spicata* is not recorded from the Philippines, but it is common in Borneo. Its nearest ally in the Philippines appears to be *E. glaucicalyx* Merr. C. B. Robinson in Philipp. Journ. Sci., IV, 382 hints that this may not be separable from *E. spicata*, but the few specimens I have seen of it show a smooth, glaucous, not pustulate calyx tube, which would place it nearer *E. grata* Wight.

123. **Eugenia grata** Wight, Ill., II, 15 (1841); Duthie in Hook. fil., F.B.I., II, 486; King, Mat. F.M.P., No. 12, 109; Ridl., F.M.P., I, 739; Craib, Fl. Siam. Enum., I, 644; Corner, Wayside Trees of Malaya, p. 498. (Fig. 44*g*).

Common on rocky and sandy seashores from Kedah and Trengganu to Johore, commonest in the north of the Peninsula, but found also in the wet forests of S.E. Johore.

Distrib: Assam, Burma, Siam, Sumatra, ? Borneo, ? Philippines.

Usually a small *tree* but reaching c. 18 m. tall, trunk sometimes slightly stilt rooted at base; bark coarsely papery flaky, reddish brown or orange brown. *Twigs* slender, terete or obscurely 4-angled, bark drying pale brown or brown, somewhat flaky in older twigs. *Leaves* coriaceous, lanceolate to ovate lanceolate, apex acuminate, base cuneate, from c. 3–11 cm. long and 1·5–5·5 cm. broad, usually c. 7–10 cm. × 2–3·5 cm., upper surface shining, drying pale brown to blackish brown, often sparsely punctate, lower surface duller and paler, often subglaucous, sometimes sparsely black dotted; midrib impressed above, more or less elevate below; *primary nerves* about 12 pairs, usually less than 0·5 cm. apart, somewhat irregular, obliquely ascending and curving up to a nearly straight intramarginal nerve 2–3 mm. from leaf margin, slightly impressed or slightly raised above, faint or very faint, usually slightly elevate and distinct below, sometimes faint, secondaries and reticulations when visible less distinct than primaries; petiole rather slender, channelled above, transversely wrinkled, c. 0·5 cm. long.

Inflorescence as in *E. spicata; flowers* white, sessile; *calyx* narrowly cylindric funnelshaped, c. 6 mm. long and 2–2·5 mm. across mouth, wrinkled and glaucous, rather obscurely glandular pustulate, contracted at base into a distinct pseudostalk 1–2 mm. long; lobes 5, erect, persistent, broadly ovate rounded or ovate triangular, c. 1–1·3 mm. across and c. 1 mm. tall; *petals* probably falling as a calyptra, free or partially agglutinated, orbicular, gland dotted, c. 1·5–2 mm. diam.; *stamens* numerous, filaments slender, reaching c. 8 mm. long, anthers elliptic oblong, c. 0·4 mm. long, connective gland distinct; *style* much stouter than filaments, terete, c. 10 mm. long; *ovary* 2-celled.

It seems probable that *E. grata* Wight is *Caryophyllus antisepticus* Bl. in DC., Prodr., III, 262 (1828); *Syzygium antisepticum* (Bl.) Merr. and Perry in Mem. Amer. Acad. Arts and Sci., XVIII, 3, 159 (1939); and that *Eugenia glaucicalyx* Merr. in Philipp. Gov. Lab. Bur. Bull., XXXV, 50, should be reduced to it, giving the species a range from Assam to the Philippines through Burma, Siam, Sumatra and Borneo, with a possible extension to China.

Unfortunately I have not seen any authentic material of *E. grata*, and of the material quoted as Bornean of *S. antisepticum* only a poor sheet of *E. cuprea* Koord. and Valet. has been available. This might easily be called *E. grata*. Merrill and Perry mention *Kunstler 5414* as being very close to *S. antisepticum*, except that the leaves are smaller. This collection has smaller and more cuspidate leaves than the bulk of the Malayan collections placed with *E. grata*, but there is a great range of variation in the shape, size and venation of the leaves in these collections.

In view of the fact that I have not been able to check the reductions made by Merrill and Perry and because the name *E. grata* is used for this species in most recent works, I prefer to leave it there in the meantime.

There is one puzzling point regarding the fruit. Duthie and King describe it as black and King makes this one of the characters separating *E. grata* from *E. spicata*, which has a white fruit. Craib, who apparently does not consider the Malayan plant to be *grata*, mentions the dark fruit of *grata* in connection with a variety of this species which he describes and which has a white fruit. *E. glaucicalyx* Merr. is described as having a white fruit. Corner, who has seen living fruit of the Malayan plant, describes it in *Wayside Trees of Malaya* as white or greenish white. The descriptions of *Caryophyllus antisepticus* do not mention fruit. These discrepancies may indicate that *E. grata* Wight is not the Malayan plant, and that we have another very closely related species taking its place, which may or may not be Blume's species. Whatever our plant may be it is closely related to *E. spicata* Lamk. but can be distinguished at once by its glaucous wrinkled calyx tube without pustulations, with usually a shorter pseudostalk.

124. **Eugenia spissifolia** Ridl. in Journ. F.M.S. Mus., V, 32 (1913–14); F.M.P., I, 753. (Fig. 44*h*).

SELANGOR: Gunong Mengkuang, 5,000 feet, *Robinson s.n.* (type collection).

A *shrub*. *Twigs* 4-angled, drying dark brown or almost black, with finely wrinkled bark. *Leaves* very coriaceous, stiff, orbicular, or broadly elliptic, or broadly oblong elliptic, apex round, base rounded and slightly cordate, up to c. 4 cm. long and 4 cm. broad; both surfaces drying yellowish, the upper polished and minutely punctate, the lower dull, somewhat rugulose and sparsely and minutely black dotted; midrib slightly channelled above, raised below and more or less keeled; *primary nerves* about 10 pairs, spreading, almost or quite invisible above, slightly raised and faint below, a very faint intramarginal nerve sometimes just visible close to the thickened and recurved leaf margin; secondaries below somewhat fainter than primaries, reticulations seldom visible; petiole very short, broad, transversely wrinkled, the leaves appearing sessile.

Panicles terminal, up to c. 2–3 cm. long, rachis and short branches 4-angled; *flowers* sessile; *calyx* narrowly funnel shaped, 9–10 mm. long, somewhat swollen at apex and gradually narrowed to base, wrinkled and obscurely pustulate; lobes 5, one much larger than the others and subpetaloid, the 4 smaller ones broadly ovate rounded, c. 1 mm. across and 0·5 mm. tall, the large one thin, broadly ovate orbicular, c. 1·5–2 mm. diam.; *petals* not seen; *stamens* numerous, short, reaching c. 1·3 mm. long, filaments stout, tapering upwards, anthers broadly ovate elliptic, c. 0·4 mm. long, connective gland none; *style* stout, 3–4 mm. long.

Known only from one collection but a distinct species in its very thick small round leaves and the long flowers with short stamens.

125. **Eugenia leucoxylon** (Korth.) Miq., Anal. Bot. Ind., I, 26, tab. 9 (1850). *Syzygium leucoxylon* Korth., Nederl. Kruidk. Arch., I, 203 (1847); Miq., Fl. Ind. Bat., I, i, 454; Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 193. *Syzygium verecundum* Wall. Cat. nom. nud. *Eugenia verecunda* Duthie in Hook. fil., F.B.I., II, 496 (1878); King, Mat. F.M.P. No. 12, 125; Ridl., F.M.P., I, 748, incl. var. *major* Ridl. in Journ. Bot., LXVIII, 33 (1930); Corner, Wayside Trees of Malaya, p. 504. (Fig. 44j).

TRENGGANU: Kemaman river mouth, *Forest Dept. FMS 26994.*
PENANG: sine loc., *Phillips s.n., Wallich 3579.*
PERAK: sine loc., *Scortechini s.n.;* Pulau Lallang, *Seimund s.n.;* Pulau Rumpia, *Kloss s.n.*

DINDINGS: Pangkor, *Scortechini 103, 137, 957, SFN 31651 (Corner)*.
NEGRI SEMBILAN: Pasir Panjang, *Forest Dept. FMS 596*.
PAHANG: Kuantan mangrove, *Forest Dept. FMS 15607*.
JOHORE: Pinerong, *Cantley s.n.;* Kangka Sedili Ketchil, *SFN 28557 (Corner)*.
SINGAPORE: Pulau Ubin, *Ridley 9486*.
Distrib: Anamba Islands; Borneo; Philippines (*fide* Merrill & Perry).

A *tree* reaching c. 15 m. tall; bark entire, very smooth with persistent leaf scars, or rather scaly, uneven and bumpy, slightly flaky fissured when old, light grey or buff grey; inner bark brownish or purplish brown with green layer below surface. *Twigs* slender, terete, bark drying pale yellowish, smooth or becoming flaky. *Leaves* thinly coriaceous, ovate, or elliptic, or oblong elliptic, apex acuminate, base broadly cuneate, from c. 5 cm. × 2·5 cm. to 10 cm. × 5 cm.; upper surface shining, drying pale brown or greenish brown to reddish brown, very minutely punctate, lower surface paler, dull, minutely black dotted; midrib impressed above, elevate below; *primary nerves* numerous and close together, meeting an intramarginal nerve c. 1 mm. from leaf margin, very fine and slightly raised on both surfaces, slightly more evident above, reticulations numerous, almost as distinct as primaries; petiole slender, reaching 1·5–2 cm. long.

Panicles terminal or from upper axils, clustered, up to c. 9 cm. long, peduncle and branches slender, 4-angled with rather dark striate bark when dry; *flowers* small, in threes or twos or solitary at the ends of the short slender 4-angled ultimate branchlets, pedicelled or sessile, the two outer flowers of the triads often pedicelled and the centre one sessile; *calyx* 2·5–3 mm. long, c. 1 mm across mouth before anthesis, constricted below the globose turbinate apex into a rather slender ribbed pseudostalk 1·5–2 mm. long; mouth with 4 distant, small but rather conspicuous, erect, broadly ovate rounded or acute lobes; *petals* agglutinated into a thick calyptra c. 1·2 mm. diam. (separable, fide Miquel); *stamens* numerous, filaments stout, up to c. 0·5 mm. long, anthers ovate, 0·2–0·3 mm. long, connective gland small; *style* stout, c. 0·5–1 mm. long; *ovary* 2-celled.

Fruit ripening white suffused rose purple, more or less ellipsoid to oblong ellipsoid, or nearly globose, somewhat compressed, slightly oblique, c. 6–7 mm. long and 5–6 mm. diam., smooth or faintly vertically ridged, apical umbilicus shallow, c. 2 mm. diam., the calyx rim usually rather prominent, 0·5–0·75 mm. tall, with obscure remains of calyx lobes and style base; cotyledons nearly equal, side by side, sessile or very shortly stalked, inner faces conspicuously gland dotted, slightly excavate.

A well marked species with its pale twigs, rather thin, closely nerved acuminate leaves with long petioles, and very small flowers.

Although I have not seen Korthal's type, nor any of the material quoted by Merrill and Perry, Korthal's description and Miquel's descriptions and figure fit our plant. I have seen no authentic material of the Philippine *E. brevistylis* C. B. Rob. which Merrill and Perry reduce to *S. leucoxylon.*

There seems to be some confusion in Ridley's Flora over this species. He gives the habitat as "hill woods to 2,000 ft. altitude" apparently on the basis of specimens from Penang of his own collecting ("Penara Bukit; Hill 2,000 ft. altitude") which I have not been able to trace. All the other collections for which data are available come from low altitudes, and the habitat of the species seems to be seashores and tidal rivers.

126. **Eugenia flosculifera** Henderson in Gardens' Bulletin, Singapore, XI, 329, fig. 15 (1947).

SINGAPORE: Reservoir Jungle, *SFN 36133* (*Corner*).
Distrib: Endemic. Specimens collected at Bukit Kajang, Kemaman, *SFN 30481* (*Corner*), may also belong here.

A *tree* c. 40 m. tall with steep narrow buttresses to c. 2 m.; crown large, spreading; *bark* light buff, slightly scaly flaky, smooth over large areas, slightly pustulate with lenticels, otherwise entire; inner bark thick, pale brownish yellow with fine longitudinal sclerotic strands; wood pale brownish buff. *Twigs* rather slender, terete, smooth, pale whitey grey to very pale yellowish, somewhat polished, youngest shoots often angled or channelled. *Leaves* thinly coriaceous, usually obovate, sometimes elliptic or oblong elliptic, up to c. 7 cm. × 3·5 cm. but usually smaller, apex abruptly acuminate, acumen up to 1 cm. long, base long narrowed and decurrent on petiole; upper surface dull olivaceous brown or blackish brown when dry, lower surface paler brown or yellowish brown, with sparse brownish gland dots; midrib sunk above, raised below; *primary nerves* up to c. 8 pairs, often fewer, 5–8 mm. distant, slightly raised above or hardly visible, fine and raised below, meeting in an intramarginal nerve c. 3 mm. from leaf margin; secondaries and reticulations invisible above, less conspicuous than primaries below, reticulations lax; petiole up to c. 1 cm. long, often finely glandular pustulate.

Panicles terminal or from upper axils, the terminal ones often fasciculate, up to c. 9 cm. long but usually shorter, primary branchlets ascending, up to c. 2 cm. long. secondary branchlets 5–7 mm. long, both slender with brown striate bark; *flowers* small, sessile, usually in threes, sometimes in pairs at branchlet ends; buds c. 3 mm. long; *calyx* c. 2·5 mm. long, c. 1·75 mm. across lobes, tube more or less fusiform, suddenly contracted below lobes, swollen about ovary, then gradually narrowed to a pseudostalk c. 1 mm. long; lobes 4, broadly triangular, blunt or subacute, incurved, c. 0·5 mm. high and 1 mm. wide; *petals* calyptrate; *stamens* about 16 in a single row on edge of disc, 0·5–1 mm. long, filaments stout, the upper part remaining sharply bent inwards until long after the flower opens, anthers 0·2–0·3 mm. long, connective gland conspicuous; *style* c. 0·5 mm. long; *ovary* 2-celled with few ovules in each cell.

Fruit pale shining green, broadly oblong to oblong obovoid, up to c. 1·5 cm. long and 1·5–1·75 cm. wide, apex depressed, with a conical excavation 4–5 mm. diam., fringed with the minute calyx rim; pericarp firm, green, slightly juicy, c. 5 mm. thick; seed 1, globose or somewhat depressed globose or obovoid, testa thin, papery, loose, pale brown, cotyledons dark blackish brown, completely fused, without visible commissure, taking the form of a hollow ball when fully ripe.

This very peculiar species is readily distinguished from all others in Malaya by its large size, its small leaves, its very small flowers with few stamens and its unusual seed; and it should perhaps be placed in a new section of the genus.

It is a striking commentary on the incompleteness of our knowledge of the flora of this region that this species, and others enumerated in this paper, should have remained undetected for so long in Singapore Island, large and conspicuous trees though they are. One can only surmise how many species may have been obliterated without becoming known to science when at this late date, when the original forest has been reduced to a few remnants, at least three species in one genus alone are found to be new, and several others have never before been collected on the island.

127. **Eugenia attenuata** (Miq.) Koord. and Valet. in Meded. Lands Plantent., XL, 121 (1900); Atlas Baumart. Java, III, fig. 490. *Jambosa attenuata* Miq., Fl. Ind. Bat., I, i, 437 (1855). *Syzygium attenuatum* (Miq.) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 185 (1939). *Eugenia penangiana* Duthie in Hook. fil., F.B.I., II, 486 (1878); King, Mat. F.M.P., No. 12, 98, pro parte; Ridl., F.M.P., I, 740, pro parte; Corner, Wayside Trees of Malaya, p. 501, fig. 168. (Fig. 45*a*, *b*).

KEDAH: Kedah Peak, c. 3,500 feet, *SFN 14849* (*Holttum*).
PENANG: Government Hill, 500 feet, *Curtis 193*; Waterfall, *Curtis 2972*; sine loc., 800 feet, *Kunstler 1368*.
PERAK: sine loc., *Scortechini 132*.

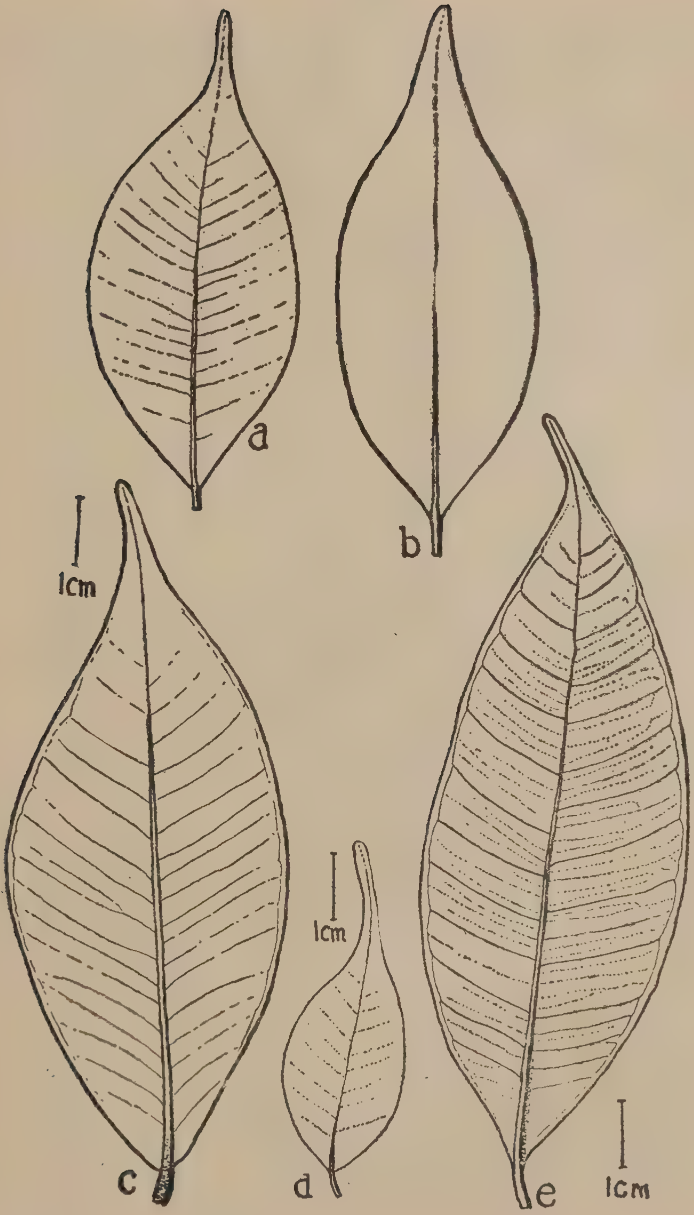
a
b
1cm
c
1cm
d
e
1cm

Fig. 45. a, b, *E. attenuata;* c, *E. attenuata* var. *montana;* d, *E. attenuata* var. *ophirensis;* e, *E. napiformis.*

SELANGOR: Kanching Forest Reserve, *Forest Dept. FMS 12474, 47141;* Sungai Lallang, *Forest Dept. FMS 24147;* Klang Gates, *SFN 10036* (*Burkill*), *Forest Dept. FMS 13136, 33202, 33205, 37445, 39400;* Sungai Tinggi, Forest *Dept. FMS 44056;* Kuala Selangor, *SFN 34075* (*Nur*).

MALACCA: Merlimau, *Derry 1177;* sine loc., *Maingay K.D. 744.*

PAHANG: 28th mile, Cameron Highlands road, *Forest Dept. FMS 36292.*

JOHORE: Top of Gunong Banang, *Ridley 11054.*

SINGAPORE: Kranji road, *SFN 29056* (*Corner*); Bukit Timah, *SFN 34680* (*Ngadiman*), *34958* (*Corner*), *34777, 36381* (*Henderson*), *36115* (*Kiah*), *36440* (*Liew*).

Distrib: Borneo, Java.

A *tree,* trunk sometimes slightly fluted-buttressed at base; bark more or less coarsely papery flaky, but not strongly so except in young trees, scaling in rather large pieces, rufous orange or warm red brown; inner bark reddish brown or pinkish fawn. *Twigs* slender, the youngest acutely 4-angled or terete, bark drying whitish to pale brown, smooth or somewhat flaky in older twigs. *Leaves* coriaceous, lanceolate or elliptic lanceolate, apex usually long acuminate with obtuse acumen, or shortly, broadly and bluntly acuminate, base acute, from c. 3 cm. × 1·5 cm. to 8 cm. × 3 cm., both surfaces drying yellowish or brownish yellow, the lower paler, rather densely punctate above and usually finely black dotted below; midrib slightly impressed above, slightly raised below and more or less keeled; *primary nerves* numerous and close together (up to c. 30 pairs), usually almost or quite invisible above, very slightly raised and very fine below, joining a very fine intramarginal nerve 1 mm. or less from leaf margin, often almost invisible, especially in thick textured leaves; petiole up to c. 5 mm. long, transversely wrinkled when dry.

Panicles terminal or from upper few axils, up to c. 7 cm. long, usually shorter, pedunculate, the peduncle, rachis and branches slender, 4-angled, the bark drying pale and more or less pustulate; *flowers* white, in threes, fives, or rather dense clusters at the ends of the short, erect-spreading branches; *calyx* 6–8 mm. long, more or less pustulate, often conspicuously so, ribbed when dry and obscurely 4-angled, narrowed below the cyathiform upper part into a very slightly tapering tube c. 5 mm. long; lobes 5, shallow broad and rounded, or 4, ovate triangular, subpersistent; *petals* free, orbicular, more or less gland dotted, c. 1·5 mm. diam., or calyptrate and more or less agglutinated; *stamens* numerous, filaments stout below, more or less glandular pustulate at base, up to c. 1·5 mm. long, anthers broadly ovate oblong, c. 0·2–0·3 mm. long, without connective gland, anther sacs somewhat divaricate; *style* stout, tapering slightly to the truncate apex, coarsely glandular pustulate, c. 2 mm. long; *ovary* 2-celled, multiovulate.

Fruit oblong or oblong-obovoid, 7–8 mm. long, 4–6 mm. across, apex deeply and narrowly excavate, fringed with remains of calyx tube and stamens, pink or pale whitey green on one side; pericarp white, outer layer juicy pulpy or fleshy, rather thin, peeling away easily from the hard very fibrous endocarp; testa thin, adhering closely to cotyledons or occasionally coming away with pericarp; seed conforming to shape of fruit, with flattened apex, cotyledons dull pinkish brown with conspicuous darker gland dots, oblique, triangular with folded inner faces, the large hypocotyle lying in the fold and extending to the periphery of seed. Germination epigeal.

Apart from certain variations in the foliage of the specimens placed under this species, consisting mainly in the distinctness or obscurity of the venation, there are also variations in the flowers. The shape of the calyx tube remains rather constant, but there may be 5 rather inconspicuous shallow lobes or 4 more distinct subacute ones, the pustulations on the tube may be evident or obscure or absent, and the petals may be free and conspicuously glandular or almost entirely agglutinated into a thick calyptra without glands. It is unlikely, however, that more than one species is represented by the material cited.

Merrill and Perry hesitate to reduce *E. penangiana* to *E. attenuata* because of conflicting statements by King and Ridley, both of whom included *E. rhamphiphylla* and *E. napiformis* in their conception of the species, but typical *E. penangiana* agrees well with material quoted under *E. attenuata* by Merrill and Perry and it agrees with Koorders and Valeton's description and figure of that species as well as with the Buitenzorg material of it. *E. attenuata* is closely allied to *E. rugosa* but is distinguishable from it not only by its smaller and less conspicuously nerved leaves and by small differences in the flower, but also by its bark characters.

E. attenuata Koord. and Valet. var. **ophirensis** var. nov. (Fig. 45*d*).

A typa foliis minoribus, latioribus, abrupte caudatis differt.

JOHORE: Mount Ophir, *Ridley s.n., 3298,* TYPE collection, holotype in Herb. Singapore, *10059, Feilding s.n.*

Apparently placed by Ridley under *E. caudata* King.

E. attenuata Koord. and Valet. var. **montana** var. nov. (Fig. 45*c*).

A typa foliis crassioribus, cortice ramulorum nigro, calycis lobis maioribus, tubo minus pustulato differt.

PAHANG: Cameron Highlands, 5,000 feet, *SFN 23559* (*Henderson*), TYPE collection, holotype in Herb. Singapore, c. 4,000 feet, *SFN 32595* (*Nur*); 47th mile, Telom road, *SFN 31256* (*Holttum*).

128. **Eugenia rhamphiphylla** Craib in Kew Bull. (1930) 168; Fl. Siam. Enumer., I, 659. *Syzygium rhamphiphyllum* (Craib) C.E.C. Fischer in Kew Bull. (1937) 438. (Fig. 46*a*).

KEDAH: Bukit Tunggal, *Forest Dept. FMS 12411.*
PENANG: Government Hill, *Curtis 2790;* Penang Hill, 100 feet, *SFN 35357* (*Kiah*).
Distrib: Burma, Siam.

A *tree.* *Twigs* slender, the youngest more or less angled, drying pale grey, older ones terete, drying brownish. *Leaves* thinly coriaceous, oblong oblanceolate or narrowly elliptic lanceolate, occasionally elliptic or oblong elliptic, apex obtusely or subacutely acuminate, base cuneate or long narrowed, from c. 5-8·5 cm. long and 2–4·5 cm. broad, both surfaces drying pale brown or reddish brown, the upper punctate or pustulate, the lower with minute scattered pustulations; midrib slightly impressed or flat above, more or less elevate below and keeled; *primary nerves* numerous, parallel and close together, curving up to an intramarginal nerve close to the recurved leaf margin, raised on both surfaces and very fine but distinct, especially below, sometimes obscure above, the reticulations almost as distinct; petiole slender, 5–6 mm. long, channelled above.

Panicles terminal or from upper axils, usually several together at tips of twigs, shorter than leaves, few flowered, usually with one pair of short branches, they and the peduncle slender, 4-angled; *flowers* sessile, in twos or threes or solitary at the ends of the branches or occasionally at the ends of very short branchlets; *calyx* c. 1·3 cm. long, longitudinally wrinkled and obscurely and minutely pustulate, campanulate above the ovary after anthesis, c. 4 mm. across mouth, suddenly contracted below to a slender pseudostalk c. 1 cm. long; lobes 5, obscurely glandular pustulate, the three outer persistent, ovate triangular, c. 1 mm. tall and a little more across base, the two inner ovate orbicular, c. 2 mm. diam.; *petals* 5, free, rather thick textured and obscurely glandular pustulate, orbicular, c. 2 mm. diam·; *stamens* numerous, filaments stout, tapering upwards, up to c. 4 mm. long, anthers ovate oblong, c. 0·4–0·5 mm. long, without connective gland; *style* stout,

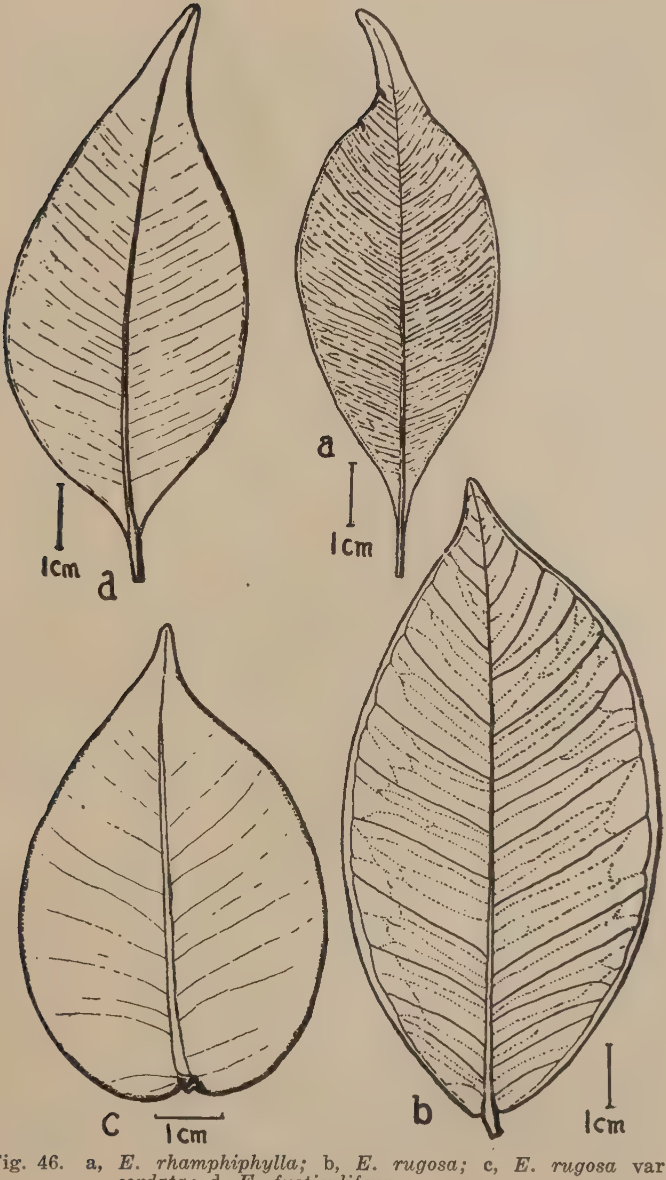
1cm
a
a
1cm
c
1cm
b
1cm

Fig. 46. a, *E. rhamphiphylla;* b, *E. rugosa;* c, *E. rugosa* var. *cordata;* d, *E. fusticulifera.*

narrowly conical with expanded truncate apex, 2–2·5 mm. long, hardly exceeding calyx rim; *ovary* 2-3-celled.

Fruit cylindric oblong or narrowly oblong obovoid, somewhat tapered to base, c. 2 cm. long and 6–8 mm. diam., pale when dry and finely wrinkled, with small but conspicuous dark gland dots, apex deeply excavate, c. 4–5 mm. across, with the very short calyx rim and remains of calyx lobes. (In the only fruiting material available, *SFN 35357*, the seed has not developed, although the fruit appears to be fully grown).

129. **Eugenia rugosa** (Korth.) Merr. in Journ. Roy. As. Soc. Str. Br., LXXVII, 224 (1917), quoad syn., non quoad pl. *Syzygium rugosum* Korth. in Nederl. Kruidk. Arch., I, 204 (1848); Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 185. *Syzygium rigidum* Wall., nom. nud., non Eugenia rigida DC. *Eugenia Goodenovii* King, Mat. F.M.P., No. 12, 117 (1901), pro parte; Ridl., F.M.P., I, 731, pro parte. *E. johorensis* Ridl., F.M.P., V (Suppl.) 308 (1925), non E. johorensis Ridl. (1912). *E. Motleyi* Ridl. in Journ. Bot., LXVIII, 33 (1930). (Fig. 46*b*).

Perak: Lower Camp, Gunong Batu Puteh, *Wray 1075;* Larut, 1,000–1,500 feet, *Kunstler 6965.*
Malacca: Merlimau, *Alvins s.n.;* sine loc., *Alvins s.n.*
Pahang: Pramau, Pekan, *Ridley s.n., 1021;* Kuantan, *Forest Dept. FMS 15071.*
Johore: 4 miles N.W. of Johore Bahru, *SFN 16352* (*Burkill & Haniff*), type collection of *E. johorensis* Ridl. (1925); Scudai river, *Ridley s.n.;* Yong Peng, *Corner s.n.;* Bukit Tinjau Laut, *Corner s.n.*
Singapore: sine loc., *Cantley s.n.;* 15th mile Jurong road, *SFN 26190* (*Corner*); Bukit Timah, *SFN 34605* (*Corner*), *SFN 34778, 34779, 35929, 35930, 35933* (*Henderson*), *SFN 35798, 36190, 36200, 36403, 36404, 36409, 36412* (*Ngadiman*).
Distrib: Borneo.

A *tree,* trunk cylindric, slightly fluted at base, or with very short small buttresses; bark narrowly or irregularly fissured, outermost layers slightly papery flaky or not, flaking in small irregular pieces or in long strips, dull red or warm red or greyish-reddish-brown; inner bark thick, fibrous, bright pinkish red, turning mauve purple on exposure. *Twigs* slender, the youngest acutely 4-angled, drying pale and slightly pustulate, older ones obscurely 4-angled to terete, brown to greyish, smooth, becoming slightly flaky. *Leaves* decussate, thickly coriaceous, variable in shape and size even on the same tree, from narrowly oblong lanceolate to ovate elliptic or ovate, apex shortly acuminate or acute, often bent back, base broadly or narrowly cuneate, from c. 6 cm. to 16 cm. long and 2 cm. to 7 cm. broad, upper surface usually shining, drying greenish brown to dark brown, more or less punctate or minutely pustulate, lower surface dull, often drying darker than the upper, minutely rugulose pustulate, or black dotted, or eglandular; midrib more or less impressed above, or channelled, elevate below, sometimes very slightly, usually more or less keeled; *primary nerves* c. 10–30 pairs, usually 0·5 cm. or less apart, often appearing close and numerous when secondaries are well marked, very slightly raised above and usually very obscure or invisible, raised and very fine below, sometimes obscure, meeting a faint intramarginal nerve 1 mm. or less from leaf margin; secondaries sometimes almost as distinct as primaries, sometimes obscure, reticulations obscure or invisible; petiole 3–10 mm. long.

Inflorescences terminal and axillary, short and densely flowered, reaching c. 4 cm. long, clustered, paniculate with few short branches or cymose, the peduncle and branches slender, angled and striate when dry; *flowers* sessile, usually in clusters at the ends of the branches and at apex of inflorescence, or in threes, twos or solitary, bracteoles very minute, broad, rounded, subpersistent; *calyx* pale green, minutely white dotted, somewhat angled and wrinkled when dry, smooth or slightly angled and ribbed in life, minutely glandular, narrowly obovoid in bud, 6 mm. to nearly 10 mm. long, after anthesis more or less funnel shaped, swollen above ovary and slightly constricted immediately below lobes, tapering gradually from below ovary to base, or slightly constricted below ovary; lobes 4 or 5, rather variable, broadly ovate, rounded or subacute; *petals* white, free, or calyptrate and partially agglutinated, rather thick textured, orbicular, up to c. 2 mm. diam.; *stamens* numerous, filaments white, up to c. 2·5 mm. long, stout, broad and flattened at base, tapering upwards, anthers ovate oblong, c. 0·4 mm. long, without connective gland; *style* stout, terete, 4–5 mm. long, hardly exceeding the calyx rim, apex truncate or rounded with conspicuous stigmatic surface; *ovary* 3-celled.

Fruit broadly obconic to slightly turbinate, up to c. 1 cm. long and 0·75 cm. across apex, bright red pink, apex more or less truncate with a deep narrow excavation c. 2 mm. diam., fringed with the short enlarged calyx lobes and withered stamens and bearing style remains; pericarp firm, outer layer white, juicy, pulpy when fully ripe, c. 1–2 mm. thick; endocarp hard, fibrous, dark green; seed more or less obovoid, c. 5 mm. × 3·5 mm., apex obliquely truncate, testa rather thick, pithy, loose, surface of cotyledons gland dotted and pustulate, pale pink, inner faces with longitudinal fold and groove accommodating the large hypocotyle which reaches the periphery of the seed at its base. The structure is similar to that in *E. attenuata.*

This species varies in foliage and flowers in much the same way as does *E. attenuata,* but again there seems no basis for considering that more than one species is involved in the material cited.

E. rugosa Merr. var. **saxitana** (Ridl.) var. nov.

Eugenia saxitana Ridl. in Kew Bull. (1928) 74.

SELANGOR: Ulu Semangkok, *Ridley s.n.*
PAHANG: Gunong Tahan, 5,000 feet, *Seimund 357* (type collection of *E. saxitana*).

The only differences between these collections and the plants placed under typical *E. rugosa* are the darker bark of the twigs of the variety, their somewhat thicker leaves, the nerves being obscure in *Seimund 357* but distinct below in Ridley's Ulu Semangkok specimen, and their mountainous habitat.

E. rugosa Merr. var. **cordata** var. nov. (Fig. 46*c*).

A typa foliis subsessilibus, latioribus, basi cordatis differt.

KELANTAN: Gunong Stong, *Forest Dept. FMS 37692, 37720.*
PAHANG: Fraser Hill, *Forest Dept. FMS 27109,* TYPE collection, holotype in Herb. Kepong, 4,000 feet, *SFN 11211* (*Nur*).
SELANGOR: Sempang, *Ridley 15599.*

This looks at first sight very different from typical *E. rugosa,* but the only real difference is the broader cordate leaves. The collections cited above differ amongst themselves considerably in size of leaf, but typical *E. rugosa* does so also, even on the same tree, although never to the extent of having cordate leaf bases.

130. **Eugenia fusticulifera** Ridl. in Journ. Bot., LXVIII, 33 (1930). *Syzygium fusticuliferum* (Ridl.) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 184 (1939). (Fig. 46*d*).

PAHANG: Rompin, *Forest Dept. FMS 15602, 17157.*
Distrib: Borneo.

A *tree. Twigs* slender, terete, bark smooth, drying pale brown or greyish. *Leaves* coriaceous, ovate lanceolate or ovate elliptic, apex bluntly acuminate, base acute, c. 6–8 cm. long and 2·75–3·5 cm. broad, both surfaces drying pale brown to cinnamon brown, the upper somewhat polished, minutely punctate, the lower dull, minutely pustulate; midrib slightly channelled above, more or less elevate below, rounded or keeled; *primary nerves* numerous and close together, meeting an almost straight intramarginal nerve less than 1 mm. from leaf margin, slightly sunk above and almost invisible, raised below, very fine and rather indistinct; petiole drying black, c. 0·5 mm. long.

Panicles terminal or from upper axils, reaching c. 7·5 cm. long, either long pedunculate and lax with 1–3 distant pairs of branches, or rather dense and branched from base, peduncle and branches slender, 4-angled; *flowers* sessile, often in threes, or in clusters at the ends of the branches or of very short branchlets; *calyx* c. 1·3 cm. long, the upper part suddenly inflated, globose turbinate, c. 4–5 mm. diam., somewhat constricted immediately below lobes, the basal part forming a slender pseudostalk c. 7–8 mm. long; lobes 5, small, distant, ovate triangular subacute, gland dotted, c. 1 mm. across and 1 mm. tall; *petals* free, ovate oblong or ovate orbicular, pellucidly gland dotted, up to c. 2·5 mm. diam.; *stamens* numerous, filaments rather stout, subulate, minutely pitted, the outer ones reaching c. 2 mm. long, the inner ones with almost no filaments, anthers broadly elliptic, c. 0.2 mm. long, without connective gland; *style* stout, c. 4 mm. long, hardly reaching the calyx rim, stigmatic surface large and conspicuous; *ovary* 4-celled.

The elongate flowers with the apex of the calyx tube suddenly inflated and globose turbinate, the short stamens and the 4-celled ovary distinguish this species.

131. **Eugenia napiformis** Koorders and Valeton in Meded. Lands Plantent., XL, 120 (1900); Atlas Baumart. Java, III, fig. 489. *Syzygium napiforme* (K. & V.) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 183 (1939). (Fig. 45*e*).

PERAK: sine loc., *Scortechini s.n., 184;* Larut, *Kunstler 3410,* 300–500 feet, *Kunstler 6759;* Sungai Larut, *Wray 3066;* Chanderiang, within 100 feet, *Kunstler 5651.*

NEGRI SEMBILAN: Gunong Angsi, *Forest Dept. FMS 23707.*

PAHANG: Raub, *Forest Dept. FMS 22570;* Cameron Highlands, *SFN 32950* (*Nur*).

Distrib: Borneo, Java.

A *tree.* *Twigs* slender, the youngest 4-angled, the older terete, bark drying pale brown to reddish or greyish brown. *Leaves* coriaceous or thinly coriaceous, elliptic lanceolate to elliptic or elliptic oblong, sometimes slightly obovate, apex acuminate, often shortly and abruptly so, base narrowed, from c. 4·5 cm. to 12 cm. long and 1·5 cm. to 6 cm. broad, both surfaces drying brownish or yellowish brown, the lower black dotted; midrib impressed above, more or less elevate below and somewhat keeled; *primary nerves* rather numerous and close together, from c. 15 to over 30 pairs in large leaves, less than 0·5 cm. apart, very slightly raised above and usually obscure, slightly raised below and very fine, usually distinct, occasionally obscure, joining a fine intramarginal nerve close to the recurved leaf margin, secondaries and reticulations less distinct than primaries below, or obscure; petiole 3–6 mm. long, channelled above.

Panicles terminal, rather short and broad and densely flowered, shorter than leaves, peduncles and branches rather slender, more or less 4-angled with pale brown or yellowish brown wrinkled bark when dry; *flowers* sessile, in twos, threes or clusters at the ends of the branches or often in threes, twos or solitary at the ends of short branchlets; *calyx* up to c. 1·3 cm. long, the upper part narrowly cupular in bud, c. 3–3·5 mm. long and 3 mm. across mouth, after anthesis widely conic-cupular, c. 5 mm. across mouth, constricted below the cupular part into a slender pseudostalk c. 10 mm. long, the whole tube rather coarsely wrinkled-tuberculate and sometimes with reddish gland dots; lobes 4 or 5, persistent, broadly ovate rounded, less than 1 mm. tall; *petals* calyptrate, but the outer one free or partially free; *stamens* numerous, filaments slender, up to 7–8 mm. long, anthers broadly ovate oblong, c. 0·4 mm. long, without connective gland; *style* stout, subulate, c. 7–8 mm. long; *ovary* 3- or 4-celled.

Fruit obconic-turbinate or obovoid, up to c. 2 cm. long, whole of apex deeply excavate, c. 6–7 mm. diam., bearing the remains of the calyx lobes. (The local material available has no developed seeds. Koorders and Valeton figure the fruit as much more broadly turbinate than in any fruiting collection from the Malay Peninsula and describe the seed as having folded and excavate inner cotyledon faces, with a long terete hypocotyle).

The five preceding species (*E. attenuata, E. rhamphiphylla, E. rugosa, E. fusticulifera* and *E. napiformis*) appear to form a closely inter-related group, characterised by the peg shaped flowers, the upper part of the calyx tube more or less suddenly expanded, the lower part forming a long fine pseudostalk. The following table shows the main distinguishing points within the group:

E. attenuata—Leaves thick, not oblanceolate, with almost invisible or faint venation, especially above; flowers c. 6–8 mm. long, calyx tube wrinkled and often conspicuously pustulate; bark papery flaky.

E. rhamphiphylla—Leaves thin, often oblanceolate, with fine but distinct venation raised on both surfaces; the acumen longer than in *attenuata;* flowers c. 1·3 cm. long, more abruptly expanded above ovary than in *attenuata* and the fruit larger.

E. rugosa—Leaves thick, usually larger than in *attenuata* or *rhamphiphylla,* primary nerves usually distinct below, not above; flowers c. 6–10 mm. long, calyx tube nearly smooth, gradually narrowed to base; bark not or only very slightly papery flaky.

E. fusticulifera—Flowers c. 1·3 cm. long, calyx tube globose turbinate above, very suddenly constricted below the inflated apex into a long slender pseudostalk.

E. napiformis—Venation fine, slightly raised below, obscure above; flowers very long, c. 1·3 cm., the upper part cupular after anthesis, calyx tube distinctly and roughly tuberculate.

132. **Eugenia virens** (Bl.) Koord. and Valet. in Meded. Lands Plantent., XL, 113 (1900). *Clavimyrtus virens* Blume, Mus. Bot. Lugd.-Bat., I, 114 (1849). *Eugenia fusiformis* Duthie in Hook. fil., F.B.I., II, 479 (1878); Ridl., F.M.P., I, 727. *Syzygium fusiforme* (Duthie) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 176 (1939). *Eugenia leptogyna* C. B. Rob. In Philipp. Journ. Sci., IV, 368 (1909). (Fig. 47*a*).

PERAK: sine loc., *Scortechini 2021;* Pondok Tanjong Forest Reserve, *Forest Dept. FMS 9788.*
MALACCA: sine loc., *Maingay K.D. 743.*
JOHORE: Mersing, *Forest Dept. FMS 5927;* Tempayan river, *Ridley 13252.*
SINGAPORE: Reservoir Jungle, *SFN 29225, 36291* (*Corner*), *Corner s.n.;* Raffles College grounds, *SFN 36293* (*Nur*).
Distrib: Borneo, Java, Philippines.

A *tree* reaching c. 21–22 m. tall, trunk fluted at base; bark very slightly scaly in small pieces, apparently smooth and entire at a distance, not pustulate, light pinkish fawn; inner bark rather thin, pallid fawn tan. *Twigs* rather stout, the youngest 4-angled with reddish brown bark, the older ones terete with greyish bark. *Leaves* coriaceous, lanceolate to elliptic or oblong elliptic, sometimes slightly obovate, apex shortly and bluntly acuminate or acute, base cuneate, variable in size, from c. 7·5 to 19 cm. long and 4 cm. to 8 cm. broad; both surfaces drying pale brown or yellowish brown to reddish brown, the upper darker, somewhat polished, closely and minutely punctate, lower surface dull, with minute, close, dark or concolorous pustulate glands; midrib rather shallowly and widely impressed

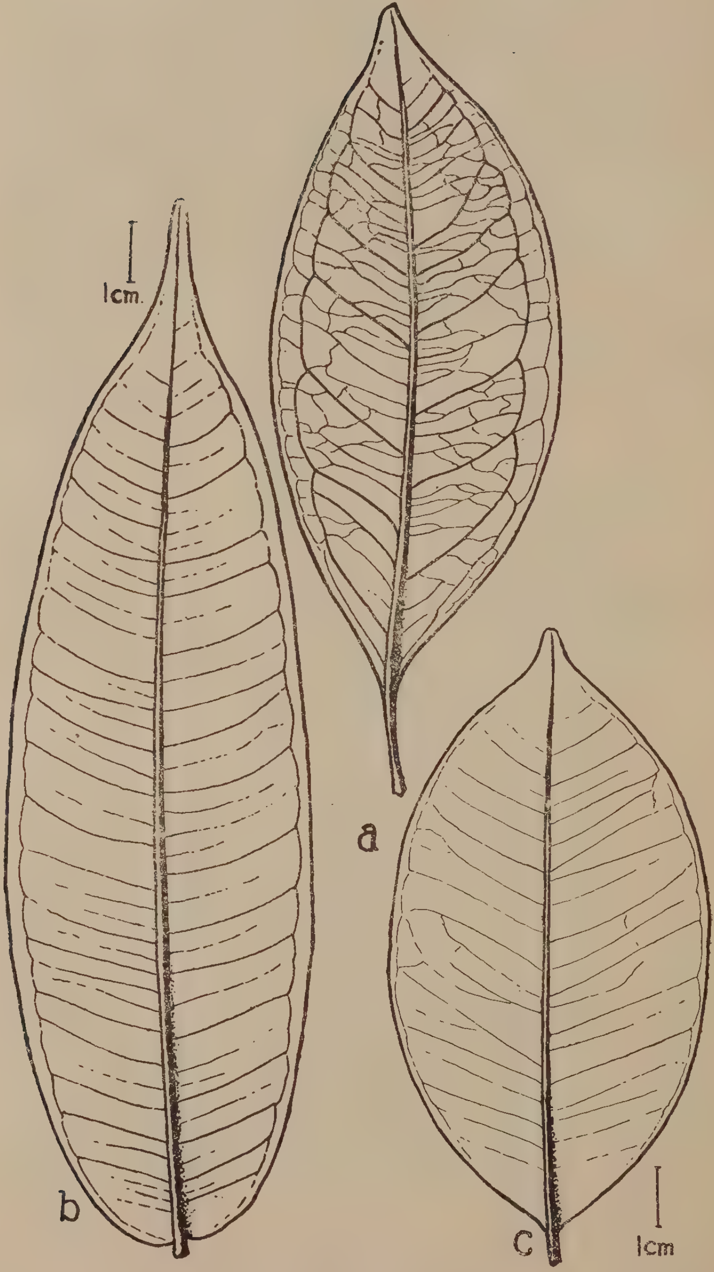

Fig. 47. a, *E. virens;* b, *E. claviflora* var. *Maingayi;* c, *E. claviflora* var. *leptalea.*

above, prominent below, more or less pustulate; *primary nerves* 10–14 pairs, elevate on both surfaces and very distinct, usually 1–2 cm. apart, obliquely ascending or curving up rather irregularly to a very distinct irregularly looped intramarginal nerve 0·5–1·2 cm. from the leaf margin, with one or two fainter series of loops closer to the margin; secondaries and reticulations also raised on both surfaces and distinct, but less prominent than primaries; leaf margin often obscurely crenulate; petiole 1–2 cm. long.

Panicles terminal or from the uppermost axils, often clustered, rather densely flowered, always shorter than the leaves, peduncles and branches 4-angled, becoming very stout in fruit; *flowers* usually in threes at the ends of the branches or of short branchlets, on pedicels 2–5 mm. long, fragrant, greenish white; *calyx* 1·2–1·4 cm. long, narrowly funnel-shaped-fusiform, slightly but distinctly swollen about ovary; lobes 4, green, unequal, very broad and rounded, persistent and reflexed after anthesis, the 2 larger 5–6–8 mm. across and 2·5–4 mm. tall, the two smaller 4–5–6 mm. across and 1·8–2·5 mm. tall; *petals* 4, free, white flushed pale pink in centre, orbicular or ovate orbicular, c. 6–8 mm. diam., concave and rather thick textured, reflexed after anthesis and dropping with the stamens; *stamens* numerous, white, filaments slender, terete, reaching c. 2 cm. long, anthers oblong, 0·8–0·9 mm. long, connective gland small and inconspicuous; *disc* thick, outer margin white, pale orange yellow within; *style* subulate, much stouter than filaments, c. 2 cm. long; *ovary* 2-celled, multiovulate.

Fruit ovoid, c. 2 cm. long and 1·75 cm. diam., smooth, apex with deep excavation c. 5 mm. diam., fringed with enlarged persistent calyx lobes; pericarp fleshy, 2–3 mm. thick; seed c. 1·2 cm. diam., rather irregularly globose or obovoid, testa dark brown, thick, crustaceous, adhering closely to cotyledons; cotyledons pale, glistening, minutely gland dotted, nearly equal, side by side or superposed, inner faces more strongly gland dotted, almost plane or a little folded, attached to hypocotyle near centre by short broad stalks, the hypocotyle variable in length but not reaching periphery of seed. Germination hypogeal, the shoot strongly red winged.

I have seen the type of *Clavimyrtus virens* Bl., and have no hesitation in reducing Duthie's species to it, although Blume's specimen is rather poor. King reduced *Clavimyrtus virens* to *E. filiformis* Duthie, but although some forms of the latter which have shorter pedicels than usual and in which the ventricose calyx tube is more pronounced, do have a superficial resemblance to *E. virens,* this species never has the characteristic long pedicels of *E. filiformis.*

133. **Eugenia pseudoclaviflora** Henderson in Gardens' Bulletin, Singapore, XI, 331, fig. 16 (1947).

PAHANG: Track to Gunong Tahan, c. 1,000 feet, on ridge, *SFN 31755* (*Kiah*).
Known only from the above collection.

A *tree* 6–7 m. tall. *Twigs* slender, terete, bark drying dull blackish brown or reddish brown. *Leaves* lanceolate or oblong lanceolate, 4–8 cm. × 1·25–2·5 cm., drying greenish or yellowish, apex long acuminate or almost caudate acuminate, acumen acute, base long narrowed; midrib sunk above, elevate below and conspicuous, otherwise the nervation visible only in young leaves and then indistinct or invisible above and faint below; *primary nerves* when visible c. 10 pairs, spaced, meeting in a very obscure intramarginal nerve close to the somewhat thickened leaf margin; petiole blackish brown, wrinkled, up to c. 5 mm. long.

Cymes short, axillary, condensed, sessile or nearly so, shorter than leaves; *flowers* sessile; *calyx* narrowly clavate, the limb slightly cyathiform, the tube long narrowed, contracted at base into a short pseudostalk, slightly ribbed and finely rugulose-pustulate, c. 12·5 mm. long including pseudostalk, which is c. 2–2·5 mm. long; lobes 4, broadly rounded, shallow, c. 0·4–0·5 mm. high; *petals* usually calyptrate, or occasionally free, subpersistent; *stamens* up to 4·5 mm. long, filaments slender, anthers broadly elliptic or ovate, c 0·5 mm. long and 0·3–0·4 mm. wide, connective gland inconspicuous; *style* c. 8 mm. long, rather stout, more or less cylindric or very slightly fusiform below; *ovary* 3- or 2-celled. *Fruit* unknown.

The inflorescence of this species is very like that of *E. claviflora*, but the flowers are shorter and stouter. The foliage resembles that of *E. attenuata*.

134. **Eugenia claviflora** Roxb., Fl. Ind., II, 488 (1832); Duthie in Hook. fil., F.B.I., II, 484; King, Mat. F.M.P., No. 12, 107; Ridl., F.M.P., I, 742; Corner, Wayside Trees of Malaya, p. 495, figs. 168, 169; Wight, Ic., II, tabs. 528, 529, 530, 606 (1843). *Syzygium claviflorum* (Roxb.) Cowan & Cowan, Trees North. Beng., 67 (1929); Merr. & Perry in Journ. Arn. Arb., XIX, 221 (1938). *Syzygium clavatum* (Korth.) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 180 (1939). *Jambosa clavata* Korth., Nederl. Kruidk. Arch., I, 207 (1847). *Eugenia clavata* (Korth.) Merr. in Journ. Roy. As. Soc. Str. Br., LXXVII, 225 (1917). *E. rhododendrifolia* Miq. et forma *longifolia* Miq., Anal. Bot. Ind., I, 19, 20, t. 2, t. 3 (1850). *Jambosa borneensis* Miq., Fl. Ind. Bat., I, i, 434 (1855).

Syzygium viridifolium (Elmer) Merr. & Perry in Mem. Amer. Acad. Arts & Sci., XVIII, 3, 183 (1939). *Eugenia viridifolia* Elmer, Leafl. Philipp. Bot., IV, 1420 (1912). *E. Fraseri* Ridl. in Journ. Bot., LXVIII, 33 (1930). *E. ruminata* Koord. & Valet. in Meded. Lands Plantent., XL, 117 (1900); Atlas Baumart. Java, III, fig. 486. (Fig. 49*a*).

LANGKAWI: sine loc., *Forest Dept. FMS 20780;* Gunong Raya, *Forest Dept. FMS 6779;* Telok Datai, *SFN 7515* (*Haniff & Nur*).
PERLIS: Besih Hangat, *Ridley 15064.*
TRENGGANU: Kuala Trengganu, *SFN 15159* (*Holttum*), *Corner s.n.*
PENANG: Muka Head, 500 feet, *Curtis 749;* seacoast, *Curtis 697;* Waterfall, *Curtis s.n.;* Batu Ferenghi road, *Ridley 8393;* Moniot's road, *Ridley 7089;* Waterfall Gardens, *SFN 36257* (*Ewart*), *Ewart s.n.* (tree No. 605); sine loc., *Stoliczka s.n.*
PERAK: Pulau Rumpia, *Seimund s.n.;* Lumut, *Ridley 7954;* Pangkor, *Forest Dept. FMS 1750, Ridley 8384.*
PAHANG: Pulau Duchong, *SFN 29857* (*Corner*); Putat Forest Reserve, *Forest Dept. FMS 10792;* Pahang East, *Forest Dept. FMS 6751.*
SINGAPORE: Government House Domain, *Ridley 11245, Addison s.n.;* Labrador, *Corner s.n.;* Pasir Panjang, *Corner s.n.*
Distrib: Sikkim, Bengal, Assam, Burma, Indo-China, China, Siam, Anamba Islands, Borneo, Java, Philippines.

A medium sized to tall *tree,* trunk cylindric, often branched near base, with very small short buttresses; bark smooth or finely longitudinally creviced, occasionally peeling in small patches or becoming slightly fissured and somewhat flaky, with peculiar shallow oblique indentations like healed scars c. 2·5–5 cm. long, pale whitey grey; inner bark very hard and dry, dull vinaceous drab. *Twigs* slender, terete or somewhat compressed, with grey or brown, smooth or slightly flaky bark. *Leaves* thinly coriaceous, lanceolate or oblong lanceolate or narrowly elliptic or elliptic oblong, variable in size, from c. 7–22 cm. long and 3–8·5 cm. broad, apex shortly and often bluntly acuminate, or acute, base cuneate, both surfaces drying pale brown to pale reddish brown, the upper somewhat the darker, very minutely punctate, the lower sometimes with minute dark or concolorous pustulations; midrib impressed above, prominent below; *primary* nerves from c. 12 to 25 pairs, irregular in spacing, from c. 3 mm. to 10 mm. apart, slightly raised and usually rather faint above, raised and fine below, distinct or very distinct, obliquely ascending or curving up, often branched, to a fine intramarginal nerve 1–2 mm. from leaf margin; secondaries and reticulations only a little less distinct than the primaries, the secondaries often difficult to distinguish from them; petiole usually less than 5 mm. long.

Flowers in very short condensed corymbs 2·5–5 cm. across, from the twigs below leaves, or axillary, sessile; *calyx* in bud narrowly cylindric clavate, 1·5–2·5 cm. long, trumpet shaped after anthesis, or the upper part of tube funnel shaped or cupular, c. 4–5 mm. across mouth, slightly constricted or gradually narrowed to base, with usually a short, slender, and not well defined pseudostalk, creamy white or greenish white tinged pink above; lobes 4 (? or 5), broadly ovate rounded or ovate triangular subacute, 1 mm. or less tall, persistent; *petals* white, falling in a calyptra but not or only partially agglutinated, ovate orbicular, thin, with a few obscure pellucid gland dots; *stamens* numerous, filaments slender, terete, reaching c. 9–10 mm. long, anthers oblong or elliptic oblong, 0·7–0·9 mm. long, without connective gland; margin of disc reddish pink; *style* stouter than filaments, subulate, glandular pustulate, c. 9 mm. long; *ovary* 3-celled (? or 2-celled).

Fruit when ripe broadly spindle shaped to ovoid or globose or oblong globose, up to c. 2 cm. long and nearly as broad, ripening from greenish pink through pink and dark red to purplish black; apex deeply excavate and fringed by the remains of the enlarged calyx lobes and bearing style remains; outer layer of pericarp juicy pulpy, nearly white, 2–3 mm. thick; a fibrous endocarp present which is distinct from the soft outer layer; the endocarp can be removed leaving the very thin brown testa on the seed, but in specimens preserved in alcohol the pulpy layer has shrunk and become firm and the whole of the pericarp peels off and brings with it the testa; seed 1, more or less obovoid, with truncate depressed apex with a deep narrow excavation, the margin of the truncate apex with raised vertical ridges extending some way down over the outer surface of the cotyledons; cotyledon surfaces very pale green, smooth and finely gland pitted, or pustulate, the cotyledons side by side with a vertical groove on one side following the commissure and filled with the thickened testa, the commissure on the other side just visible as a fine wavy line; cotyledons firmly locked together but not fused, so that it is possible to prise them apart, but usually with difficulty and with some fracturing of the tissues; inner faces pale, irregularly rugose with rounded depressions and projections fitting into one another. An irregularly branching dark brown structure occupies more than half the volume of the cotyledons and ramifies through their tissue. Whether or not this brown tissue is continuous with the testa and intrudes from the external groove has not been made out. No trace of radicle or plumule can be seen. On germination the radicle protrudes from the base of the seed, its tissue apparently continuous with that of the basal part of the seed. The cotyledons never separate, but remain as a solid mass until long after the seedling is well established.

As far as I can discover, Koorders and Valeton, in their description of *E. ruminata,* are the only authors to draw attention to the very curious structure of the seed of this species. They describe it as "Semina testa tenuis cum placenta intra cotyledones conferruminatas intus valde ruminatas intrusa".

Roxburgh mentions that the fruit of *E. claviflora* is eaten in Chittagong. In Penang the ripe fruit is preserved as a pickle and known as *Buah Rumuyu.*

A much wider view is taken here of the species than by most other authors. As defined here it is a polymorphic and widely distributed group. To it should perhaps also be added *E. teretiflora* Koord. & Valet., which I have not seen. However, when fruit of all the various forms is obtained, a reclassification of them may be necessary.

Wight, Ic., tab. 530 almost certainly represents *E. claviflora.* It is certainly not *E. lanceolata* Lamk., a photograph of the type of which I have seen. Tab. 529, labelled *E. Wightiana* Wight, also represents *E. claviflora.* I have seen no very authentic material of *E. Wightiana,* but if the series of specimens so named in Herb. Dehra Dun is to relied upon, it differs.

Only rather poor material of *E. ruminata* Koord. & Valet. has been available, but this, along with the authors' description and figure, makes the reduction reasonable. The description and drawing of the fruit and seed of *E. ruminata* correspond very closely to the peculiar structure found in *E. claviflora.*

E. claviflora Roxb. var. **leptalea** (Craib) var. nov. (Fig. 47*c*).

E. leptalea Craib, Fl. Siam. Enum., I, 649 (1931). *E. leptantha* Wight, Ill., II, 15 (1841); Duthie in Hook. fil., F.B.I., II, 484; Ridl., F.M.P., I, 741; non Benth. (1840). *E. claviflora* Roxb. var. *leptantha* King, Mat. F.M.P., No. 12, 108 (1901). *Syzygium leptanthum* (Wight) Niedenzu in Engl. & Prantl., Nat. Pflanzenfam., III (7), 85 (1893); Merr. & Perry in Journ. Arn. Arb. XIX, 222.

PERLIS: Bukit Lagi, *Ridley 15065.*
PAHANG: Pramau, Pekan, *Ridley 1019, 1109.*
Distrib: Range of typical form.

Differs from the typical form in having the leaves broader in proportion to their length, and in the smaller flowers, c. 1 cm. long.

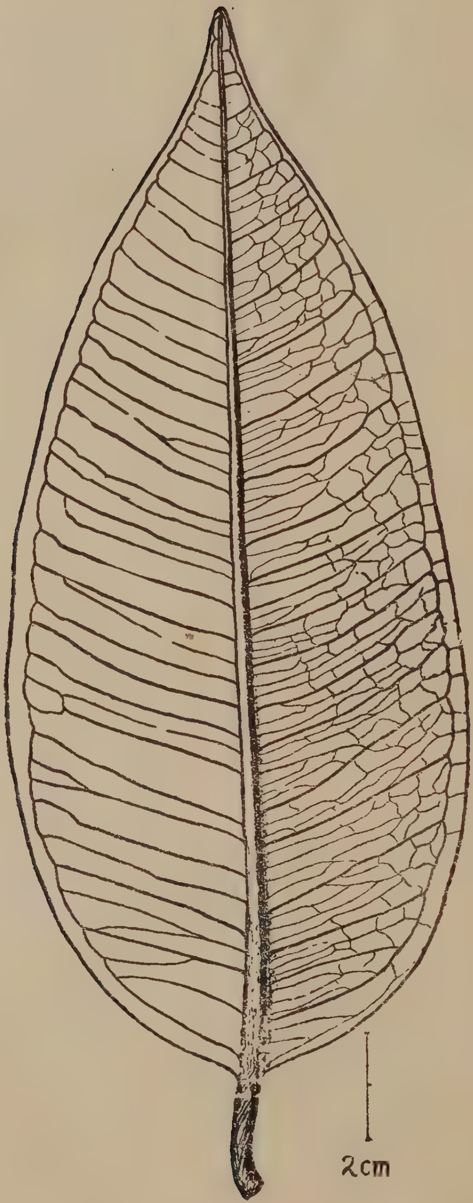

Fig. 48. *E. claviflora* var. *montana*.

E. claviflora Roxb. var. **excavata** King, Mat. F.M.P., No. 12, 108 (1901). (Fig. 49*c*).

PENANG: Sungai Telok Bahang, *SFN 4560* (*Burkill*); Richmond Pool, Penang Hill, *Ridley s.n.*

PROVINCE WELLESLEY: Permatang Bertam, *Ridley 6970.*

PERAK: Ulu Kendrong, Upper Perak, *Forest Dept. FMS 11603;* Bubu Forest Reserve, *Forest Dept. FMS 29863, 30889;* Larut, 500–1,000 feet, *Kunstler 7440.*

PAHANG: Sungai Teku, 500 feet, *SFN 31925* (*Kiah*); Rotan Tunggal Forest Reserve, *Forest Dept. FMS 28536.*

? SINGAPORE: "Victory Island", *Hullett s.n.*

Distrib: ? Endemic.

Differs from the typical form in the rough bark of the twigs, the leaves usually longer and broader, the venation below more pronounced and the intramarginal nerve much more distinct.

E. claviflora Roxb. var. **Maingayi** King, Mat. F.M.P., No. 12, 108 (1901). *E. Maingayi* Duthie in Hook. fil., F.B.I., II, 484 (1878). *E. claviflora* Roxb. var. *glandulosa* King, loc. cit. (Fig. 47*b*).

KELANTAN: Chabang Tongkat, *Forest Dept. FMS 37847;* Sungai Jerai, *Forest Dept. FMS 37824.*

PENANG: Government Hill, *Maingay K.D. 750* (type collection of *E. Maingayi* Duthie).

MALACCA: Mount Ophir, *Hullett 780.*

JOHORE: Ulu Kahang, c. 250 feet, *SFN 10879* (*Holttum*); 13½ mile Mawai-Jemaluang road, *SFN 31940* (*Corner*).

Distrib: ? Endemic.

Distinguished by the acutely angled and winged young twigs, or twigs with corky fissured bark, thicker leaves and rather faint nerves. The Kelantan collections have rather smaller thinner leaves than the others, rounded and minutely cordate at base, not shortly and abruptly narrowed.

I have rearranged the varieties given by King in the Materials, for I believe that he included more than one form, including the typical one, under his var. *excavata,* and that var. *glandulosa* is not sufficiently distinct.

E. claviflora Roxb. var. **riparia** var. nov. (Fig. 49*b*, Fig. 50).

A typa foliis lineari-lanceolatis, ad 15 cm. longis et 1·5 cm. latis differt.

PAHANG: Kuala Tahan, *Seimund 927*, TYPE collection, holotype in Herb. Singapore; Tahan river, *Corner s.n.*

A well marked narrow-leaved river bank form.

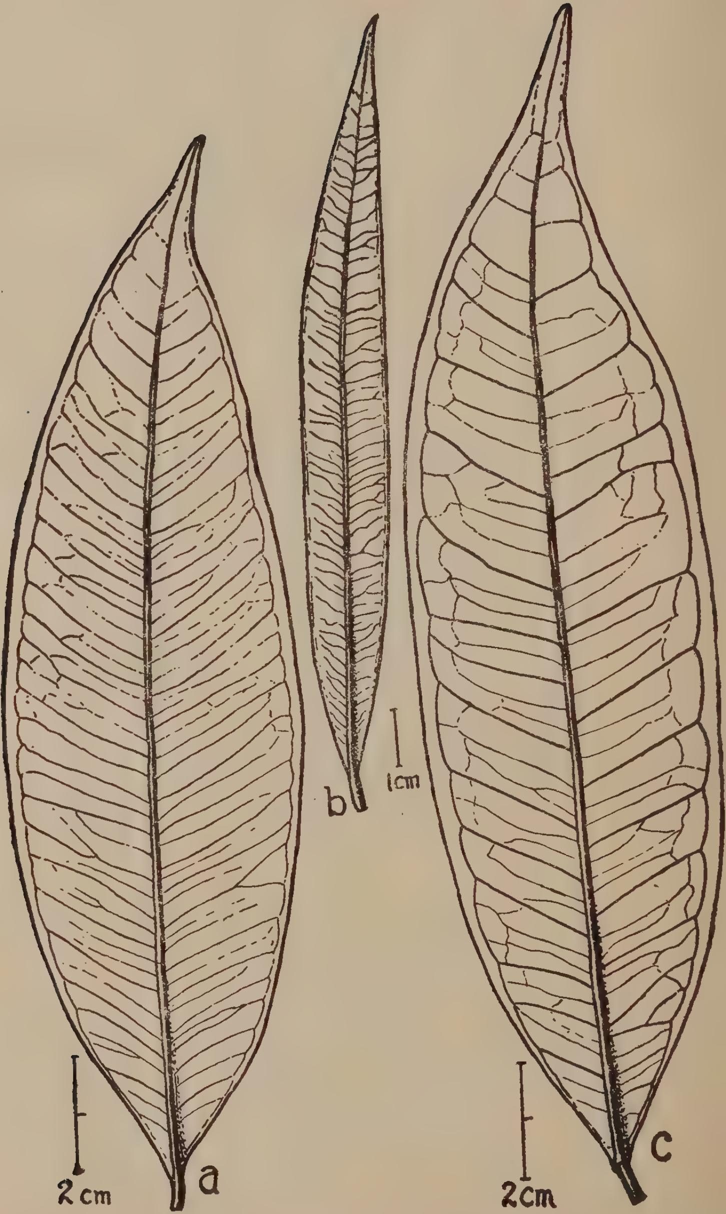
a
2 cm
b
1cm
c
2cm

Fig. 49. a, *E. claviflora;* b, *E. claviflora* var. *riparia;* c, *E. claviflora* var. *excavata.*

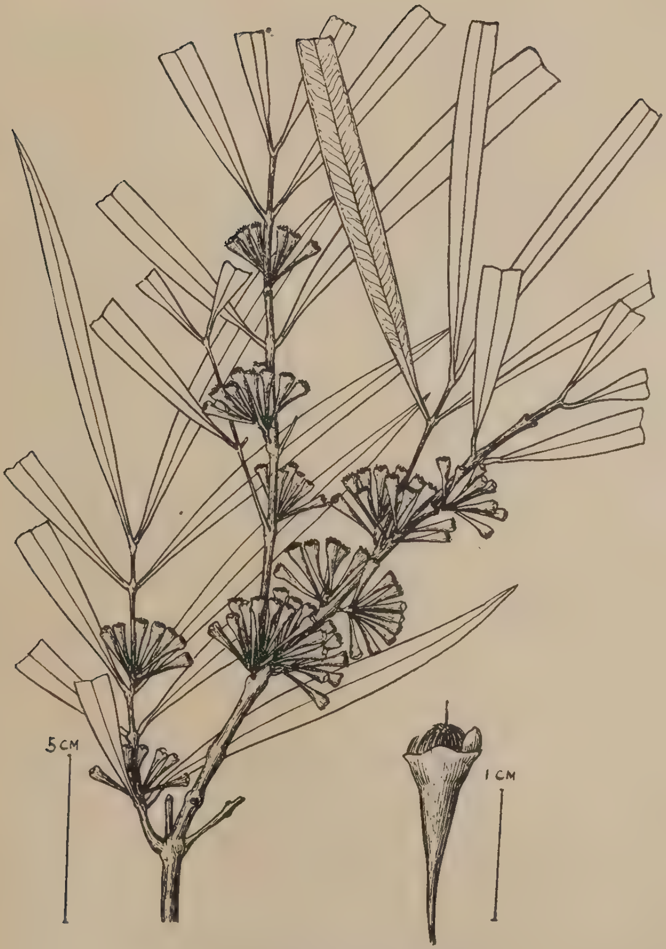

Fig. 50. *E. claviflora* var. *riparia.*
Del: CHAN YORK CHYE.

E. claviflora Roxb. var. **montana** var. nov. (Fig. 48).

A typa folia crassioribus, ramulis crassis angulatis, floribus interdum longioribus differt.

KEDAH: Kedah Peak, *FMS Mus. 6019* (*Robinson & Kloss*).

TRENGGANU: Gunong Padang, 4,000 feet, *SFN 33914* (*Moysey & Kiah*), TYPE collection, holotype in Herb. Singapore.

PAHANG: Wray's Camp, Gunong Tahan, *Ridley 16273*.

JOHORE: Gunong Janeng, *Lake & Kelsall 4076;* Gunong Belumut, summit, *Holttum 98*.

The collections placed under this variety differ considerably amongst themselves. *Ridley 16273* has ovate or ovate lanceolate leaves with a cuneate base and distinct petiole, and flowers larger than the typical form. *Lake & Kelsall 4076* has oblong lanceolate leaves, rounded at the base and practically sessile, with flowers of the typical form. *FMS Mus. 6019* has oblong lanceolate leaves, narrowed at the base and shortly petiolate, with flowers of the typical form. *SFN 33914* has large ovate leaves with a broad base abruptly narrowed to a distinct stout petiole, and flowers larger than the typical form. *Holttum 98* has leaves rather like *SFN 33914,* but more narrowed to a rounded somewhat oblique base.

Of the five varieties enumerated here fruit of two only has been available—of var. *Maingayi,* of which *SFN 31940* is a fruiting collection in which the seed structure corresponds closely to that of the typical form; and of var. *montana,* of which *Holttum 98* is a fruiting collection in which, unfortunately, the seeds have been destroyed by insect larvae.

---

§ ACMENA—Anther cells globose, divaricate, opening by terminal slits; seed pseudomonocotyledonous.

135. **Eugenia Cumingiana** Vidal, Phan. Cuming. Philipp., 173 (1885); Craib, Fl. Siam. Enum., I, 636; Corner, Wayside Trees of Malaya, p. 496. *Myrtus acuminatissima* Bl., Bijdr., 1088 (1826). *Acmena acuminatissima* (Bl.) Merr. & Perry in Journ. Arn. Arb., XIX, 12 (1938). *Eugenia acuminatissima* Kurz, Pegu Report, App. A, 63 (1875); Duthie in Hook. fil., F.B.I., II, 483; King, Mat. F.M.P., No. 12, 126; Koord. & Valet. in Meded. Lands Plantent., XL, 155 (1900); Atlas Baumart. Java, III, fig. 506, excl. fruit; Ridl., F.M.P., I, 747; non Miq. (1847) nec Berg. (1857–59).

E. saligna C.B. Rob. in Philipp. Journ. Sci., Bot., IV, 392 (1909), non Jambosa saligna Miq. (Fig. 51*a*, Fig. 52).

Widespread in Malaya and fairly frequent, usually in lowland forest and secondary growth, but recorded from Cameron Highlands at about 4,500 feet.

Distrib: Assam. Tenasserim, Andaman Islands, Siam, South China, Sumatra, Bangka, Natuna Islands, Java, Borneo, Philippine Islands, Solomon Islands.

A medium sized to large *tree*, base of trunk sometimes stilt rooted; bark nearly smooth or slightly flaky or slightly fissured or rugose, not papery, pale brownish or pinkish fawn; inner bark thin, pale pinkish or pinkish fawn; wood yellowish. Youngest *twigs* slender, 4-angled, older ones terete, drying pale brown or reddish brown with smooth bark becoming slightly flaky. *Leaves* usually thinly coriaceous, lanceolate or oblong lanceolate, sometimes ovate lanceolate, apex caudate acuminate or long acuminate, the acumen usually long, narrow, and acute, base cuneate or narrowly acute, variable in size, usually c. 9 cm. × 3–4 cm., but varying from c. 5–13 cm. long and 1·5–5 cm. broad, upper surface smooth, drying greyish green or pale brown or pale reddish brown, minutely punctate, lower surface drying pale brown or reddish brown, sparsely black dotted; midrib impressed above, elevate below; *primary nerves* c. 8–15 pairs, slightly raised on both surfaces, usually faint above, faint or rather distinct, but fine below, from c. 3 mm. to 10 mm. apart, ascending rather irregularly and curving up to a fine intramarginal nerve 1–4 mm. from leaf margin, secondaries and reticulations usually faint or obscure, occasionally almost or quite as distinct as primaries; petiole drying dark and transversely wrinkled, up to c. 1 cm. long.

Panicles terminal or occasionally from upper axils, usually lax with many distant branches, reaching c. 12 cm. long, peduncle and divaricate branches slender, 4-angled, with longitudinally wrinkled pale bark when dry; *flowers* small, white, sessile, usually in threes, sometimes in twos or solitary, at the ends of the slender ultimate branchlets; *calyx* turbinate-clavate, c. 3–4 mm. long, the lower half suddenly contracted into a slender pseudostalk, the upper part after anthesis more or less cupular and c. 2 mm. across mouth; lobes 5, subpersistent, minute, broadly triangular acute; *petals* 4 or 5, free, erect, orbicular or oblong ovate c. 1 mm. tall; *stamens* numerous, the longest slightly less than 1 mm., filaments broad at base, anthers very small, c. 0·1 mm. across, the cells globose, divaricate, opening by terminal slits; *style* very stout, reaching or slightly exceeding the calyx rim; *ovary* 2-celled.

Fruit depressed globose, up to c. 2 cm. across, almost black when ripe, apical umbilicus c. 3–4 mm. diam., sunken, sometimes with remains of calyx lobes; pericarp fleshy, white; seed 1, when just beginning to germinate more or less depressed globose, semi-reniform, the brown semi-crustaceous testa still adhering closely to cotyledons. No commissure is visible and it is impossible to separate the cotyledons. When cut open the seed appears to be a solid mass of tissue with a dark brown mass ramifying through it, entering the cotyledons near the apex of the seed. There is no movement apart of the cotyledons on germination, and the seed is still a solid mass of tissue when the seedling is 10 cm. tall. The first scale leaves may be alternate, opposite, or the first pair opposite and the next alternate. One seedling had three alternate leaves, then an opposite pair.

The structure of the seed is similar to that of *E. claviflora,* carried further towards complete fusion of the cotyledons.

There is a considerable range of variation in the foliage characters of the specimens cited. *Curtis 654* from Penang Hill and *Forest Dept. FMS 32* from the Larut Hills have smaller more closely nerved leaves than the typical form and superficially look very like *E. rhamphiphylla* Craib, but the acute acumen of the leaf in *E. Cumingiana* would serve to distinguish these species if no flowers or fruit were available. The set of specimens from Cameron Highlands has much thicker, more coarsely nerved leaves with shorter and denser inflorescences. Merrill and Perry also draw attention to the variability in this widely distributed species, and in connection with their remarks on the leaves being not always truly opposite, it may be pointed out that this occurs in other species of *Eugenia* in the section *Syzygium,* especially on young twigs. In *E. filiformis* for example, it is possible occasionally to find a twig with all the leaves alternate.

C. B. Robinson reduces *Jambosa saligna* Miq. to this species, apparently without having seen Miquel's specimen and relying on the synonymy given in Koorders and Valeton, Meded. Lands Plantent., XL, 155. I have seen Miquel's type and agree with Craib and Merrill and Perry that it does not belong here.

A full discussion and synopsis is given by Merrill and Perry, loc. cit., of *Acmena* as a generic segregate from *Eugenia,* and a description of the curious seed structure which is characteristic of this section of the genus.

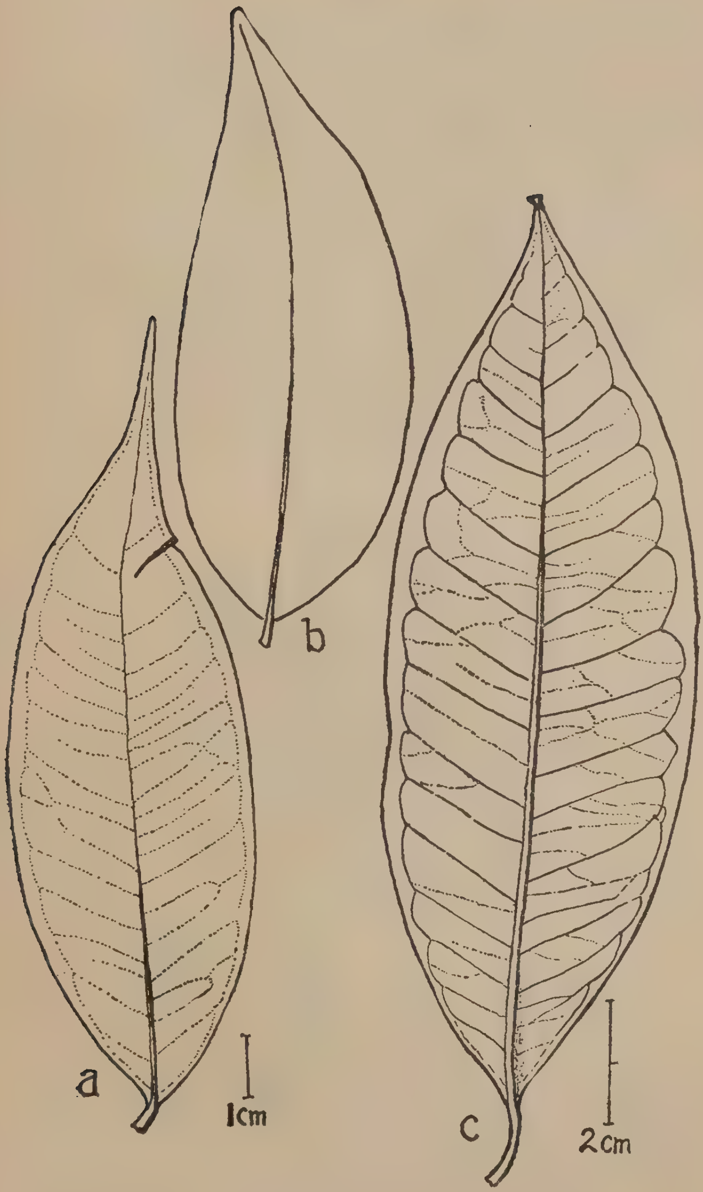

Fig. 51. a, *E. Cumingiana;* b, c, *E. operculata.*

§ CLEISTOCALYX—Calyx calyptrate, the upper part falling as a lid.

136. **Eugenia operculata** Roxb., Fl. Ind. II, 486 (1832); Hort. Beng. 37 (1814), nomen nudum; Wight, Ic. Pl. II, t. 552 (1842); Duthie in Hook. fil., F.B.I., II, 498; King, Mat. F.M.P., No. 12, 129; Koord. & Valet. in Meded. Lands Plantent., XL, 148 (1900); Atlas Baumart. Java, III, fig. 503; Ridl., F.M.P., I, 754. *Syzygium operculatum* (Roxb.) Niedenzu in Engl. & Prantl, Nat. Pflanzenfam., III, vii, 85 (1893). *Cleistocalyx operculata* (Roxb.) Merr. & Perry in Journ. Arn. Arb., XVIII, 337, pl. 215 (1937). (Fig. 51*b*, *c*, Fig. 53).

KEDAH: Kampong Naka, 100 feet, *SFN 19801* (*Holttum*); Inchong Estate, 20 feet, *SFN 36349* (*Spare*).

PENANG: Penara Bukit, 1,000 feet, *Curtis 1444*.

PERAK: sine loc., *Scortechini 306;* Matang, seacoast, *Wray 2725;* Dindings, *Ridley 8388.*

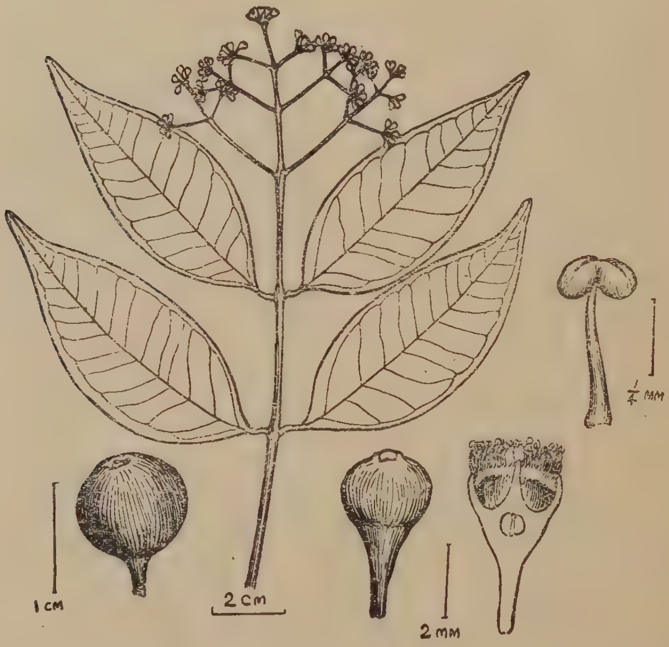

Fig. 52. *E. Cumingiana.*

Del: CHAN YORK CHYE.

Selangor: Kuala Selangor, *Forest Dept. FMS 43746;* Klang river, *Forest Dept. FMS 44010;* Sungai Pelek, Sepang, *Denny 58, s.n.*

Pahang: Tembeling, *SFN 21803 (Henderson).*
Distrib: India, Burma, China, Indo-China, Siam, Sumatra, Java, Borneo, Philippines, ? Amboina, Australia.

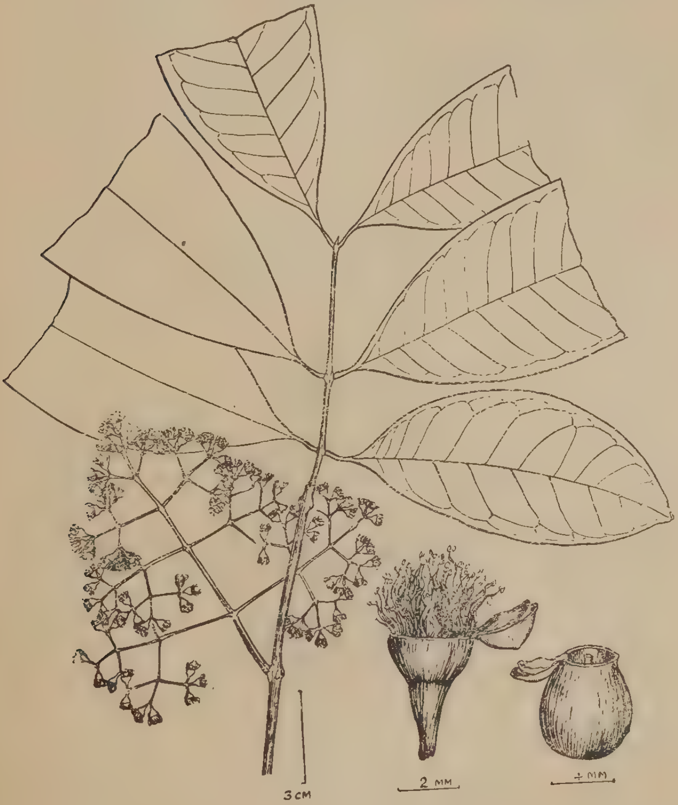

Fig. 53. *E. operculata.*
Del: Chan York Chye.

A *tree;* bark almost smooth, finely creviced into small pieces, pale greyish brown, inner bark thick, pallid buff. *Twigs* slender, youngest compressed and grooved, somewhat pustulate, drying brown, older ones terete, drying greyish. *Leaves* thinly coriaceous, variable in shape, oblong lanceolate or elliptic lanceolate to ovate oblong, apex shortly and bluntly acute or acuminate, base cuneate, from c. 9 cm. × 3 cm. to 22 cm. × 7 cm.; upper surface drying greenish brown to reddish brown, more or less shining, closely and minutely gland dotted, lower surface dull, usually pale brown, gland dotted or pustulate; midrib impressed above, elevate below, pustulate; *primary nerves* c. 8–15 pairs, distant (usually c. 1 cm. apart), slightly raised or channelled above, pale, distinct, elevate and distinct below, nearly straight or curving up to a rather fine intramarginal nerve 3–6 mm. from the leaf margin, with sometimes a further series of fainter loops nearer the margin; secondaries and lax reticulations very faint above, much less conspicuous below than the primaries; petiole up to c. 1·5 cm. long, channelled above.

Panicles from twigs below leaves, rarely terminal, reaching c. 8–10 cm. long (longer in fruit), pedunculate, trichotomous, lax, with long, distant, almost horizontal branches, they and the peduncle slender, more or less 4-angled; *flowers* green or yellow in bud, turning red, in threes at branchlet ends, sessile, or the centre flower of the triads occasionally shortly pedicellate; *calyx* in bud completely closed, obovate-globose apiculate, 4·5–5·5 mm. long, gland dotted, the upper part falling as a circumscissile, orbicular, conic, apiculate, gland dotted calyptra 3–3·5 mm. diam., after anthesis the calyx somewhat campanulate, the margin recurved, rather abruptly narrowed into a stout, tapering 4-angled pseudostalk c. 2 mm. long, the mouth truncate or irregularly wavy with the remains of the calyptra; *petals* apparently 4, adhering to the inside of the calyx calyptra and falling with it, but separable, oblong ovate or ovate orbicular, thin, conspicuously gland dotted, margins lacerate, 2–2·5 mm. diam.; *stamens* numerous, filaments slender, terete, sparsely glandular pustulate, up to c. 6 mm. long, anthers oblong elliptic, c. 0·4 mm. long, connective gland conspicuous; *style* much stouter than filaments, subulate, sparsely glandular, c. 10 mm. long; ovary 2- or 3-celled.

Fruit ovoid globose, c. 1 cm. long, ripening from white to bright red and finally dark red, with dark gland dots when dry, apex with a wide, deep excavation c. 4 mm. diam., fringed by the short calyx rim; seed 1, oblong globose, c. 7 mm. long, testa pithy-leathery, adhering closely to cotyledons; cotyledons side by side, nearly equal, subreniform, inner faces conspicuously gland dotted, excavate, interlocking by thin broad bands of tissue arising from the margins of the cotyledons on one side and curving inwards, and attached to the stout quadrangular conspicuously gland dotted hypocotyle which reaches the surface of the seed.

Merrill and Perry, loc. cit., pp. 322–343, give an account of *Cleistocalyx* as a generic segregate from *Eugenia* and enumerate the species.

---

§ FISSICALYX—Henderson in Gardens' Bulletin, Singapore, XI, 333 (1947).

Calyx tube produced above disc, the stamens arising from its inner surface above the disc, the tube splitting longitudinally after the flower opens into several irregular lobes.

Calyx in bud c. 2·5 cm. × 1 cm., primary nerves c. 15 pairs, intramarginal nerve 0·5–0·7 cm. from margin ..	137 *Symingtoniana.*
Calyx c. 4 cm. × 3 cm., primary nerves 18–25 pairs, intramarginal nerve 2–3 mm. from margin	138 *Watsoniana.*

These two species appear to be aberrant in Eugenia in the characters given above. So far as I can discover, the position of the stamens, scattered over the inner surface of the calyx tube above the disc, has not been described previously in Myrtaceae, and these plants might be better placed in a new genus. However, only rather scanty dried material has been available, and the flowers have become so hard and woody that a detailed and exact examination of them has been difficult. Apart from the flowers, no-one familiar with Eugenia would hesitate to place these plants in that genus.

137. **Eugenia Symingtoniana** Henderson in Gardens Bulletin, Singapore, XI, 333, fig. 17 (1947). (Fig. 54*a*).

Perak: Sungai Sah, Kinta, *Forest Dept. FMS 14721, 28055.*
Pahang: Bukit Goh Forest Reserve, Kuantan, *Forest Dept. FMS 3136;* Baloh, Kuantan, *Forest Dept. FMS 3719;* Gunong Rokam, Pulau Tioman, 2,500 feet, *SFN 18779* (*Nur*).
Trengganu: Sungai Paka, *Forest Dept. FMS 26723;* Ulu Brang, c. 800 feet, *SFN 33750* (*Moysey & Kiah*), specimen with immature fruits, identification doubtful.

A *tree* c. 3–13 m. tall. *Twigs* terete, smooth, drying whitish or greyish white. *Leaves* elliptic to elliptic oblong, occasionally oblong lanceolate, up to 20 cm. × 10 cm., apex abruptly short acuminate or sometimes abruptly caudate, base cuneate and more or less decurrent on petiole; *primary nerves* up to c. 15 pairs, 0·75–2 cm. distant, impressed above, prominent but not thick below, running nearly straight or curving gently up to an intramarginal nerve 0·5–0·7 cm. from margin, a much fainter intramarginal c. 0·2 cm. from margin; secondaries and reticulations faint above, distinct below, reticulations rather lax; upper surface drying fuscous dull or greyish brown, lower a warmer reddish brown; petiole stout, up to c. 1 cm. long.

Flowers usually solitary or occasionally in pairs at ends of branches, sessile; *calyx* in bud subglobose to obovoid, c. 2·5 cm. long and 1 cm. wide when mature, more or less campanulate after anthesis, slightly swollen about ovary, constricted at base into a short stout pseudostalk; lobes ? 4, short, round, gland dotted; the tube splitting deeply after anthesis into several deep irregular triangular false lobes; *petals* ? 4, free, thin, suborbicular with a short broad claw, c. 5–6 mm. diam., apparently often subpersistent as are the calyx lobes, and adherent to the apices of the rolled back false calyx lobes; *disc* lining calyx tube to c. 0·5 cm. above ovary; *stamens* borne on the whole surface of the calyx tube above disc, the tube being produced c. 1 cm. above disc; filaments very numerous, slender, c. 1·5 cm. long; bases of the fallen stamens giving the inner surface of the rolled back false calyx lobes a tesselate appearance; anthers oblong, 0·6–0·7 mm. long, without conspicuous connective gland; *ovary* 2-celled, multiovulate.

Fruit apparently reaching c. 3 cm. diam., apex crowned with the remains of the calyx tube and recurved calyx lobes, c. 1·5 cm. diam.

138. **Eugenia Watsoniana** Henderson in Gardens Bulletin, Singapore, XI, 336, fig. 18 (1947). (Fig. 54*b*).

SELANGOR: Sungai Lallang Forest Reserve, *Forest Dept. FMS 22928;* Kanching Forest Reserve, *Forest Dept. FMS 9563, 5795;* Rantau Panjang Forest Reserve, *Forest Dept. FMS 595.*

A *tree* up to c. 10 m. tall. *Twigs* terete, with smooth or slightly flaky bark, almost white or greyish white. *Leaves* more or less coriaceous, narrowly elliptic to oblong elliptic, base narrowed, apex very abruptly and shortly acuminate or shortly acute, up to 20 cm. × 8 cm.; petiole rather stout, c. 1–1·5 cm. long, the lamina occasionally somewhat decurrent upon it; *primary nerves* 18–25 pairs, 0·75–1·5 cm. apart, more or less impressed above, prominent below but not thick, nearly straight or curving gently up to a well marked intramarginal nerve usually 2–3 mm. from leaf margin; secondaries and reticulations usually almost invisible above, not conspicuous below.

Flowers apparently solitary and terminal, sessile, large; *calyx* more or less campanulate, shortly narrowed at

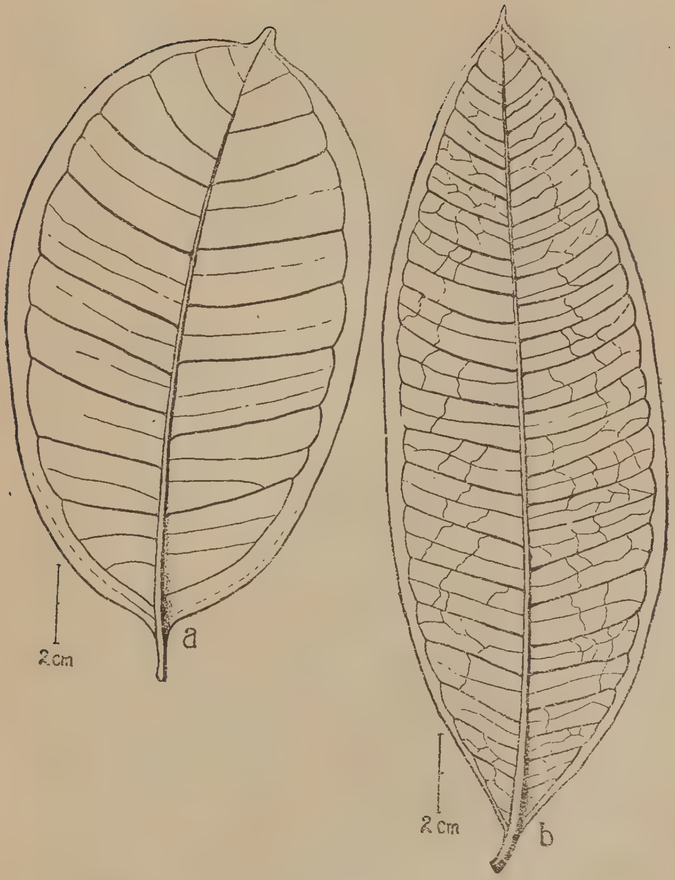

Fig. 54. **a**, *E. Symingtoniana;* **b**, *E. Watsoniana.*

base to a very short stout pseudostalk, smooth or faintly longitudinally ribbed and thick and leathery in texture when dry, in mature bud c. 4 cm. long and 3 cm. across, lobes 4, short, broad and rounded, the calyx tube after anthesis splitting into 6 or 7 rather irregular lobes 1–1·5 cm. long; *petals* not seen; *stamens* very numerous, borne on the surface of the calyx tube above disc, filaments very slender, c. 1·5–2 cm. long, anthers oblong, c. 0·7 mm. long, connective gland inconspicuous; *style* stouter than filaments, c. 3 cm. long; *ovary* 2-celled below, 4-celled above, multiovulate.

Fruit globose or depressed globose, 5–6 cm. diam., smooth or very faintly vertically ribbed when dry, crowned by the massive remains of the calyx tube 6–9 mm. tall and c. 2 cm. diam., fringed by the recurved false calyx lobes; pericarp hard and woody when dry, 5–7 mm. thick, testa nearly 1 mm. thick; cotyledons nearly equal, probably sessile, their inner faces apparently almost plane or slightly concave, attached to the hypocotyle near their centres.

Closely allied to *E. Symingtoniana* but distinguished from it by the more numerous primary nerves of the leaf, the larger flowers and in the stamens arising from a smaller area of the calyx tube.

EXCLUDED AND ADDITIONAL SPECIES

Eugenia tetrahaedra (Miq.) Duthie in Hook. fil., F.B.I., II, 476 (1878).

Duthie identifies with *Jambosa tetrahaedra* Miq. a specimen collected by Griffith, and *Maingay K.D. 732*, both from Malacca. *Maingay K.D. 732* in Herb. Kew is *E. grandis* Wight. *Griffith K.D.* 2370 in Herb. Calcutta is *E. palembanica* (Miq.) Merr. This sheet bears the following pencilled note: "Leaves exactly as in Jambosa? tetrahaedra Miq., but branches are here terete," and is probably the specimen referred to by Duthie (loc. cit. p. 477) when he says "Kurz in an MS note in the Calcutta Herbarium suspects that this is the E. tetrahaedra of Miquel but with some hesitation on account of the terete branchlets". I have examined a duplicate of the type of *Jambosa tetrahaedra* Miq. No Malayan material is referable to it. A cover in Herb. Calcutta bears the following pencilled note in King's hand: "Duthie's *E. tetrahaedra* F.B.I., II, 476 is *E. lepidocarpa* Wall.".

Eugenia ciliaris Ridl., Kew Bull. (1928) 74.

This is *Decaspermum montanum* Ridl. in Journ. Roy. As. Soc. Str. Br., LXI, 6 (1912): F.M.P., I, 718.

Eugenia aromatica Kuntze, Rev. Gen., 239 (1891). *Caryophyllus aromatica* Linn., Sp. Pl. 735 (1753); *Eugenia caryophyllata* Thunb., Diss. I (1799); Koord. & Valet., Atlas Baumart. Java, III, fig. 478.

Usually a small *tree* of conical shape, reaching c. 20 m. tall; twigs ascending, terete, smooth, greyish white. *Leaves* coriaceous, lanceolate or narrowly elliptic, sometimes narrowly obovate, up to 12 cm. × 4·5 cm., apex very shortly and broadly bluntly acuminate, base long narrowed, upper surface glossy dark green, lower dull and paler; *primary nerves* over 20 pairs, irregularly spaced but usually less than 5 mm. apart, fine and translucent in the living leaf, intramarginal nerve fine, close to the somewhat wavy and recurved leaf margin; secondaries almost as distinct as primaries; petiole slender, up to c. 2·5 cm. long, the leaf blade decurrent upon it, the basal 5–6 mm. somewhat swollen and pinkish.

Panicles terminal, corymbose, trichotomous, shortly pedunculate or branched from base, shorter than leaves, few-many-flowered; *flowers* fragrant, usually in threes at branchlet ends, on stout variable pedicels, the centre flower of the triads usually on a much shorter pedicel than the outers; bracts and bracteoles narrow, acute, 2–3 mm. long, quickly caducous; *calyx* tube c. 1–1·5 cm. long, c. 5 mm. diam. below lobes, green in bud, cylindric, angled, base very slightly narrowed, without pseudostalk, flushed pink at anthesis and turning deep reddish pink after the stamens fall, lobes 4, narrowly ovate acute, fleshy, c. 3–4 mm. tall, erect and slightly incurved and green in bud, erect-spreading and pink after anthesis; *petals* 4, green, falling in a hemispherical calyptra c. 6 mm. diam. but not agglutinated and easily separable, orbicular, c. 6 mm. diam.; *stamens* very numerous, appearing grouped in 4 masses, arising from between the outer edge of the rather prominent narrow disc and the calyx tube, filaments nearly white, glandular pustulate, inner ones c. 3 mm. long, the longest outer ones reaching 9–10 mm., anthers yellow, ovate or ovate oblong, c. 0·5 mm. long, connective gland small, pale brown and inconspicuous; *style* very stout, swollen at base, very pale green and gland dotted, c. 4–4·5 mm. long; *ovary* 2-celled, multiovulate.

Fruit oblong, usually shortly tapered to each end, 2·5–3 cm. long, 1·3–1·5 cm. diam., apex with the 4 enlarged narrow fleshy calyx lobes incurved over and hiding the apical excavation; pericarp thin, pulpy fleshy, c. 2–3 mm. thick; seed 1, pinkish purple tinged green, with purplish testa, oblong, rounded at both ends, c. 2 cm. long; cotyledons side by side, inner faces gland dotted, excavate and folded and interlocking, attached near their centres to the large hypocotyle, which reaches the periphery of the seed at apex or base or midway; germination epigeal.

The clove tree, native of the Moluccas and nowadays cultivated in Malaya only to a limited extent, mostly in Penang.

NOTES ON THE SEED STRUCTURE OF SOME EXOTIC SPECIES OF EUGENIA.

E. apiculata DC. (Chilean). Seeds 1–3, in the 1-seeded fruits flattened, more or less reniform, c. 4·5–5 mm. long, testa thick, brown, adhering to but peeling easily from cotyledons; cotyledon surfaces dull green, gland dotted, the commissure along the narrow edge, cotyledons quite free, interlocking, attached to the large terete truncate hypocotyle close to periphery of seed.

E. bracteata Roxb. (E. Indian). Seed globose, c. 8 mm. diam., testa dark brown, thick, brittle-crustaceous; cotyledons smooth, pale yellowish brown, the commissure equatorial but not complete, the inner faces fused for about one-half or one-quarter of their area; cotyledons, including the free parts of the inner faces, covered with an exceedingly fine epidermis-like layer.

E. carissoides Muell. (Australian). Seed more or less globular, flattened, c. 1 cm. diam.; cotyledons partially fused together, sometimes round the periphery and free within, or fused for one-third or one-quarter of the area of the opposing faces.

E. cordata Laws. (S. African). Fruit oblong obovate, c. 2 cm. long, dark reddish purple when ripe; pericarp spongy-juicy, white. Testa usually persistent; cotyledons free, the inner faces slightly excavate, attached to the short hypocotyle by very short broad stalks. Often polyembryonic.

E. costaricensis Berg. (Costa Rican). Seed flattened, horseshoe shaped, two blunt incurved points at one end; testa brown, adhering closely to cotyledons; cotyledons gland dotted, apparently completely fused.

E. cyanocarpa Muell. (Australian). Fruit somewhat oblong globose, c. 1 cm. long, apical umbilicus c. 5 mm. diam., rather deep with rather conspicuous calyx rim and more or less persistent calyx lobes, style base persistent; pericarp apparently pulpy; seed more or less globose, c. 7–8 mm. diam., testa thick, brown, leathery, not adhering strongly to cotyledons but not peeling with the pericarp; cotyledons free, somewhat unequal, side by side, conspicuously gland dotted, inner faces somewhat concave, not folded or interlocked, sessile, attached to hypocotyle near periphery.

E. Dombeyana DC. (Peruvian). Seeds flattened, more or less reniform, c. 1 cm. or more across, testa smooth, rather tough and leathery, not adhering closely to cotyledons; cotyledons smooth or slightly wrinkled, free only at one side and there interlocking, otherwise fused together.

E. Luehmanni Muell. (Australian). Fruit more or less spindle shaped, c. 1·4 cm. long and 6–8 mm. diam.; seed irregularly globose, c. 5 mm. diam., with brownish leathery testa adhering closely to the more or less wrinkled and conspicuously gland dotted cotyledon surfaces; cotyledons more or less equal, attached by very broad, thin, triangular stalks to a long stout hypocotyle grooved on one side and reaching the periphery of the seed.

E. Michelii Lam. (S. American). Seed oblong or subreniform, cotyledons entirely or partially fused together. Germination hypogeal.

E. supra-axillaris Spring. (Brasilian). Seed more or less globose, 5–6 mm. diam., testa rather thick and hard, adhering closely to cotyledons; cotyledons apparently completely fused together, no commissure visible, remaining as a solid mass of tissue until after the seedling is established.

LIST OF COLLECTORS' NUMBERS.

ALVINS—45: spicata; 68: filiformis; 79: Muelleri; 82: spicata; 146: pachyphylla; 236: spicata; 258: tumida; 273: papillosa; 422: conglomerata; 436: Scortechinii; 543: filiformis; 668: Duthieana; 784: filiformis var. clavimyrtus; 808: inophylla; 881: pachyphylla; 932: spicata; 1021: grandis; 1202: tumida; 1282: pachyphylla; 1295: tumida; 1503*b*: Muelleri; 1648: Cumini; 1735: Muelleri; 1760: spicata; 1860: grandis; 1862: valdevenosa; 1954: javanica; 1964: Scortechinii; 2045: inophylla; 2280: subdecussata; 3302: Scortechinii; 3329: Scortechinii var. cuneata.

ANDERSON—76: Muelleri.

BARNES—10869: spicata var. tenuiramis; 10882: subdecussata.

CANTLEY—12: pseudosubtilis; 34: chlorantha; 37: pseudosubtilis; 45: palembanica; 49: papillosa; 50: Cumingiana; 58: Duthieana; 75: filiformis; 76: polyantha; 186: pseudoformosa; 212: pustulata; 212: polyantha; 214, 219: chlorantha; 2636: filiformis; 2678, 2680: longiflora; 2689, 2692: pergamentacea; 2785: tumida; 2937: syzygioides; 2942: spicata; 2961: Muelleri; 3031: papillosa; 3041: Duthieana; 3112: Cumingiana; 3151: pseudosubtilis; 3165: Cumingiana; 3205: grata.

CANTLEY'S COLLECTOR—3128: tumida.

CLEMENS—30248: valdevenosa; 31300: pterophorum.

CUMING—2405: spicata.

CURTIS—32: pseudosubtilis; 55: valdevenosa; 114: spicata; 179: Kunstleri; 180: chlorantha; 193: attenuata; 194: Griffithii; 212: Helferi; 247: cerasiformis; 317: grata; 511: polita; 653: Duthieana; 654: Cumingiana; 666: laevicaulis; 697: claviflora; 728: longiflora; 744: caudata; 749: claviflora; 750: laevicaulis; 751: grandis; 756: grata; 794: Haniffii; 864: subdecussata; 937: inophylla; 937: nigricans; 973: oblata; 974: inophylla; 975: Bernardi; 976: nigricans; 1089: fastigiata; 1090: filiformis var. clavimyrtus; 1114: javanica; 1152: glauca; 1428: pseudosubtilis; 1440: pergamentacea; 1442: densiflora; 1443: filiformis var. clavimyrtus; 1444: operculata; 1445: polyantha; 1448: Griffithii; 1448: chlorantha; 1466: spicata; 1510: valdevenosa; 1534: Griffithii; 1539: chlorantha; 2007: caudata; 2228: glauca; 2244: fastigiata; 2245: grata; 2246, 2247: laevicaulis; 2410: Thumra var. penangiana; 2417: longiflora; 2621: oblata; 2750: longiflora; 2778: glauca; 2790: rhamphiphylla; 2845: Bernardi; 2898: syzygioides; 2971: polyantha; 2972: attenuata; 3010: Ridleyi; 3175: fastigiata; 3275: Griffithii; 3287:

Helferi; 3431: densiflora; 3435: syzygioides; 3440: glauca var. pseudoglauca; 3456: longiflora; 3475: pseudosubtilis; 3498: Duthieana; 3593: chlorantha; 3601: Thumra var. penangiana; 3601: Ridleyi; 3625: subdecussata; 3700: pachyphylla; 3731: syzygioides; 3758: caudata; 3807: chlorantha; 3827: Helferi.

Curtis's Collector—12707: cerasiformis; 12721: Cumingiana; 12723: longiflora.

Denny—56: conglomerata; 58: operculata; 60: pachyphylla; 61: conglomerata; 62: longiflora; 113, 114: microcalyx.

Derry—21: Muelleri; 53: tumida; 106: spicata; 133, 138: pendens; 147: pachyphylla; 221: longiflora; 256: Duthieana; 269: palembanica; 289: anisosepala; 451, 471: filiformis; 476: subdecussata; 516: longiflora; 531: pachyphylla; 550, 968: longiflora; 974: palembanica; 975: subdecussata; 1039: longiflora; 1097: grandis; 1104: glauca; 1107: pseudosubtilis; 1154: cerina; 1175: Griffithii; 1177: attenuata; 1178: cerasiformis; 1194, 1230: filiformis; 1238: glauca.

Diepenhorst—3083: avene.

Elmer—21223, 21237: pustulata; 21448, 21460: fastigiata; 21518, 21762: Kunstleri.

Federated Malay States Museums (FMS Mus.)—6019: claviflora var. montana; 6080: subdecussata var. montana; 7656: longiflora; 8023, 8307: Scortechinii; 9273: grata; 9365, 9485: pseudoformosa; 9488, 10488: subdecussata; 10604, 10687: pendens; 10769: pseudosubtilis; 11595: cerasiformis; 11696: Stapfiana; 12139: pahangensis; 12180: viridescens; 12244, 12249: pahangensis; 13181: spicata; 13183, 13185: oblata; 13186: grata.

Forest Department, Federated Malay States (Forest Dept. FMS)—20: tumida; 27: longiflora; 32: Cumingiana; 159: longiflora; 205: pseudosubtilis; 212: leptostemon; 257: Griffithii; 262: papillosa; 266: densiflora; 328: spicata; 343: Stapfiana; 363: filiformis; 368: variolosa; 381: filiformis; 457: variolosa; 472: microcalyx; 516: fastigiata; 550: palembanica; 572: microcalyx; 573: anisosepala; 573: horizontalis; 579: pergamentacea; 579: filiformis var. clavimyrtus; 580: subdecussata; 580: anisosepala; 595: Watsoniana; 596: leucoxylon; 623: polyantha; 641: Ridleyi; 682: longiflora; 802, 804: Cumingiana; 855: polyantha; 894: filiformis var. clavimyrtus; 905: longiflora; 913: fastigiata; 936: variolosa; 962: longiflora; 1010: subdecussata; 1128: filiformis var. clavimyrtus; 1139: subdecussata; 1217: tumida; 1223:

Bernardi; 1250: microcalyx; 1263: Dyeriana; 1416: grandis; 1576: perakensis; 1578: cerina; 1589: chlorantha; 1603: glauca var. pseudoglauca; 1652: grata; 1682: grandis; 1750: claviflora; 1809: tumida; 1830: polyantha; 1850: grata; 1879: longiflora; 1960: Ridleyi; 2053: Griffithii; 2058: longiflora; 2082a: pustulata; 2082b: Ridleyi; 2105: Griffithii; 2155: polyantha; 2279: variolosa; 2283: tetraptera; 2287: valdevenosa; 2314, 2325: syzygioides; 2351: longiflora; 2358: grandis; 2407: longiflora; 2441: polyantha; 2633: chlorantha; 2671: polyantha; 2701: Cumingiana; 2704, 2772: grandis; 2787: densiflora var. angustifolia; 2793: cerasiformis; 2927: grandis; 2934: Scortechinii; 2939: filiformis var. clavimyrtus; 3022: tumida; 3023: longiflora; 3130: filiformis; 3136: Symingtoniana; 3202: palembanica; 3202: Hemsleyana; 3302: papillosa; 3308: variolosa; 3345: syzygioides; 3615: cerina var. turbinata; 3618: grandis; 3624: densiflora var. angustifolia; 3702: cerasiformis; 3719: Symingtoniana; 3726: grandis; 3908: polyantha; 3912: Curtisii var. minor; 3914: pseudosubtilis; 4003, 4007: polyantha; 4028: Scortechinii var. cuneata; 4106: cerina var. turbinata; 4157: nitidula; 4185: grandis; 4208: cerina var. turbinata; 4210: oblongifolia; 4211: densiflora; 4494: Griffithii; 4582: longiflora; 4749: microcalyx; 4783: pallidula; 4892, 4902: microcalyx; 4962: grandis; 5113: microcalyx; 5191: fastigiata; 5302: leptostemon; 5385: filiformis; 5460: pseudosubtilis; 5667: Cumingiana; 5707: inophylla; 5750: perakensis; 5795: Watsoniana; 5927: virens; 6016: longiflora; 6057: polita; 6365: filiformis; 6392, 6407: microcalyx; 6435: grandis; 6439: Griffithii; 6439: valdevenosa; 6656: anisosepala; 6682: polita; 6691: grandis; 6751: claviflora; 6766: nigricans; 6779: claviflora; 7015: Griffithii; 7031: fastigiata; 7065: Griffithii; 7515a: grata; 7552: syzygioides; 7619: pachyphylla; 7623: polyantha; 7661, 7679: syzygioides; 7750: fastigiata; 7751: Curtisii var. Holttumii; 7796: pseudosubtilis var. montana; 7843: Dyeriana; 7950: filiformis var. clavimyrtus; 7972: fastigiata; 7988: Griffithii; 8040: leptostemon; 8128: nigricans; 8261: variolosa; 8262: Griffithii; 8264: Cumingiana; 8277: chlorantha; 8278: filiformis var. clavimyrtus; 8376: longiflora; 8536: Scortechinii; 8864: longiflora; 8866: microcalyx; 8971: pustulata; 8987: longiflora; 9021: anisosepala; 9036: oblata; 9355: filiformis; 9519: Cumingiana; 9563: Watsoniana; 9632: subdecussata var. montana; 9681: Dyeriana; 9717: pallidula; 9755:

Cumingiana; 9758: filiformis var. clavimyrtus; 9788: virens; 9799: papillosa; 10146: grandis; 10208: glauca var. pseudoglaucă; 10233: microcalyx; 10236: grandis; 10246: anisosepala; 10350: polyantha; 10641: Duthieana; 10661: polyantha; 10666: papillosa; 10785: Duthieana; 10792: claviflora; 10841: variolosa; 11013: pendens; 11049: leptostemon; 11274: filiformis; 11575: cerasiformis; 11603: claviflora var. excavata; 11777: syzygioides; 11792, 11798: Koordersiana; 11062, 12112: Dyeriana; 12139: pseudosubtilis; 12403: syzygioides; 12411: rhamphiphylla; 12421: syzygioides; 12425: Helferi; 12474: attenuata; 12484: subdecussata; 12486: pseudosubtilis; 12776: linocieroidea; 12779: Griffithii; 12783: Cumingiana; 12794: Duthieana; 12853: polyantha; 12860: Haniffii; 12872: subdecussata var. montana; 12961: pseudosubtilis; 13023: polita; 13025: Griffithii; 13036: attenuata; 13051: papillosa; 13211: inophylla; 13383: Haniffii; 13444: densiflora; 13615: leptostemon; 13663: densiflora; 13681, 13685: tumida; 13992, 13993, 14506: Griffithii; 14685: filiformis; 14721: Symingtoniana; 14820: tumida; 14960: Ridleyi; 14976: pallidula; 15071: rugosa; 15112: Griffithii; 15132: chlorantha; 15204: grandis; 15308: filiformis var. clavimyrtus; 15417: longiflora; 15421: Burkilliana var. garcinifolioides; 15602: fusticulifera; 15607: leucoxylon; 15696: subdecussata; 15700: longiflora; 15719: grandis; 16417: chlorantha; 16440: longiflora; 16502: pendens; 16509: fastigiata; 16534: pseudoformosa; 16886: densiflora; 17095: polyantha; 17104: Curtisii var. minor; 17157: fusticulifera; 17168: cerina var. turbinata; 17465: Bernardi; 17473: microcalyx; 17564: Dyeriana; 17708: Ridleyi; 17739: syzygioides; 17757: polyantha; 17768: Ridleyi; 17786: longiflora; 17859: Dyeriana; 17917: laevicaulis; 17928: grata; 17932: polita; 17939: chlorantha; 18010: Dyeriana; 18030: polyantha; 18242: papillosa; 18958: chlorantha; 19857: longiflora; 20117: Dyeriana; 20220: grandis; 20229: cerasiformis; 20231: grata; 20255: Dyeriana; 20305: tumida; 20405: jasminifolia; 20465: pseudosubtilis; 20493: valdevenosa; 20672: polyantha; 20780: claviflora; 20794: fastigiata; 20806: Bernardi; 21497: syzygioides; 21530: grata; 22299: densiflora; 22335: Wrayi; 22390: valdevenosa; 22422, 22446: subdecussata var. montana; 22477: leptostemon; 22497: caudata; 22537: cerina var. montana; 22570: ?napiformis; 22928: Watsoniana; 22937: fastigiata; 23134: densiflora; 23149: papillosa; 23330, 23364: tumida; 23397: valdevenosa; 23413: leptostemon;

23707: ?napiformis; 23782: pustulata; 23886: Wrayi; 24147: attenuata; 24620: cerina; 24633: filiformis; 25795: jasminifolia; 25812: variolosa; 25893: subdecussata var. montana; 25920: cerina var. montana; 25941: Wrayi; 26723: Symingtoniana; 26763: densiflora var. angustifolia; 26824: palembanica; 26910: jasminifolia; 26994: leucoxylon; 27109: rugosa var. cordata; 27110: oreophila; 27135: tetraptera; 27151: cerina; 27245, 27246: filiformis; 27309: nitidula; 27365: chlorantha; 27553: Bernardi; 27580: valdevenosa; 28055: Symingtoniana; 28109: goniocalyx; 28233, 28335: jasminifolia; 28360: valdevenosa; 28536: claviflora var. excavata; 28973: chlorantha; 29093: pseudosubtilis; 29095: grandis; 29353: Bernardi; 29486: subdecussata var. montana; 29488: Stapfiana; 29490: oreophila; 29791: tetraptera; 29803: linocieroidea; 29856: caudata; 29863: claviflora var. excavata; 30689: grandis; 30764: chlorantha; 30791: Scortechinii var. cuneata; 30889: claviflora var. excavata; 31010: nitidula; 31018: tetraptera var. pseudotetraptera; 31025: Cumingiana; 31026: Dyeriana; 31447: Wrayi; 31448, 31449: oreophila; 31482: subdecussata var. montana; 31516: Duthieana; 32103, 32215: Stapfiana; 33041: pergamentacea; 33068: grata; 33093: grandis; 33202, 33205: attenuata; 33225: grata; 33413: ?malayana; 33502: grandis; 33655: filiformis; 33727, 33728: variolosa; 33754: pseudocrenulata; 33798: filiformis; 34016: goniocalyx; 34227: scalarinervis; 35755: spicata var. tenuiramis; 36134: oreophila; 36220, 36238: subdecussata var. montana; 36265: tetraptera var. pseudotetraptera; 36271: Dyeriana; 36292: attenuata; 36518, 36552: Wrayi; 36564: Stapfiana; 36569: Wrayi; 37445: attenuata; 37541: densiflora var. angustifolia; 37692: rugosa var. cordata; 37696: Stapfiana; 37720: rugosa var. cordata; 37751: jasminifolia; 37768, 37787: subdecussata var. montana; 37824, 37847: claviflora var. Maingayi; 38104: grandis; 39209, 39264: pendens; 39358: leptostemon; 39400: attenuata; 40708, 40709: pendens; 41651: papillosa; 41652: cerina var. turbinata; 41703: papillosa; 42889: tahanensis; 42944: salictoides; 43135: syzygioides; 43167: grandis; 43208: spicata; 43328: syzygioides; 43330: longiflora; 43578: syzygioides; 43588, 43643: grata; 43729: papillosa; 43732: perakensis; 43744: oblata; 43746, 44010: operculata; 44033: setosa; 44056: attenuata; 44060: cerina var. turbinata; 44066: oblata; 45413: tetraptera var. pseudotetraptera; 47141: attenuata.

Fox—32: Cumini; 11290: Muelleri; 12576: cerasiformis; 12726: microcalyx.

Fox's Collector—12576, 12684: oblata.

Franck—352: Muelleri.

Goodenough—114: densiflora; 445: chlorantha; 1643: palembanica; 1649: avenis; 1673: spicata; 1743: filiformis; 1759: Goodenovii; 1872: papillosa; 1985: subdecussata; 3829: papillosa; 4974: densiflora; 4975: leptostemon; 4978, 4978a: longiflora; 4987: pseudosubtilis; 5072: densiflora; 10604: Dyeriana.

Griffith (Kew Distribution ("K.D.") numbers. *See* note under Maingay)—2349: pendens; 2366: claviflora; 2368, 2369: grandis; 2369, 2370: palembanica; 2371: pachyphylla; 2375: Griffithii; 2376: palembanica; 2380: anisosepala; 2385: chlorantha; 2389: filiformis; 2390: longiflora; 2391: syzygioides; 2395: polyantha; 2405: Muelleri; 2410, 2411: microcalyx; 2416: glauca.

Gwynne-Vaughan—356: pachyphylla; 612: oblata.

Haniff—3915: Wrayi; 15483: grata.

Harvey—21: tumida; 4994: tumida.

Henderson—1266: pustulata.

Holmberg—675: polyantha; 721: longiflora; 729: spicata; 782: tumida; 793: papillosa; 859: polita; 873: papillosa.

Holttum—3: ?rhomboidea; 58: cerina var. montana; 98: claviflora var. montana.

Hullett—134: filiformis; 165: densiflora; 194: polyantha; 240: syzygioides; 316: filiformis: 339: palembanica; 346: inophylla; 400: subdecussata; 403: Muelleri; 465: inophylla; 533: spicata; 631: Muelleri; 638: syzygioides; 780: claviflora var. Maingayi; 805: subdecussata; 806: palembanica; 812: syzygioides; 814: grandis; 848: Duthieana; 848: polyantha.

Kerr—17128: microcalyx var. irregularis; 21754: pseudosubtilis.

Kloss—25: Klossii; 103: leucoxylon.

Krukoff—3304, 4390: valdevenosa.

Kunstler (*King's collector* of some works)—18: longiflora; 713: leptostemon; 737: valdevenosa; 738: densiflora; 1172: Cumini; 1184: tumida; 1277: chlorantha; 1326: longiflora; 1368: attenuata; 1579: valdevenosa; 1771: oblata; 1793: pseudosubtilis; 1803: cerasiformis; 1863: tecta; 1901: chloroleuca; 1908, 2150, 2317: leptostemon; 2321: filiformis var. clavimyrtus; 2605:

fastigiata; 2686: pseudomollis; 2737: valdevenosa; 2796: variolosa; 2808: pseudomollis; 2813: papillosa; 2842: valdevenosa; 3310: Kunstleri; 3345: leptostemon; 3348: Scortechinii; 3349: Dyeriana; 3401: pseudoformosa; 3407: Hoseana; 3410: napiformis; 3415: variolosa; 3422: pseudosyzygioides; 3475: cerina; 3491: Dyeriana; 3526: Pearsoniana; 3573: Dyeriana; 3654: caudata; 3680: Kunstleri; 3724: pustulata; 3752: subdecussata; 3782: cerina; 3966: Duthieana; 3995: variolosa; 4076, 4082: chlorantha; 4086, 4094: longiflora; 4132: fastigiata; 4181: Helferi; 4218: Duthieana; 4220: chlorantha; 4241: caudata; 4262: leptostemon; 4331: Cumingiana; 4346: cerasiformis; 4355: densiflora; 4405: longiflora; 4515: cerasiformis; 4541: garcinifolia; 4580: linocieroidea; 4674: spicata; 4682: densiflora; 4719: Burkilliana; 4734: Scortechinii; 4735: Cumingiana; 4741: inophylla; 4769: subdecussata; 4947: valdevenosa; 4951: chloroleuca; 5122: valdevenosa; 5163: subdecussata; 5208: syzygioides; 5266: setosa; 5298: Dyeriana; 5309: Prainiana; 5322: valdevenosa; 5354: subdecussata; 5389: pseudoformosa; 5407: fastigiata; 5414, 5433: grata; 5447: setosa; 5483: cerasiformis; 5512: fastigiata; 5547: quadrata; 5572: pseudomollis; 5595: perakensis; 5601: filiformis; 5618: chlorantha; 5641: fastigiata; 5651: napiformis; 5721: densiflora; 5780: polita; 5822: fastigiata; 5855: densiflora; 5861: filiformis; 5868: densiflora; 5869: papillosa; 5904: spicata; 5925: filiformis var. clavimyrtus; 5982: Griffithii; 5986: microcalyx; 5988: longiflora; 5989: Griffithii; 5990: microcalyx; 5994: camptophylla; 6012: oblongifolia; 6036: variolosa; 6079: inophylla; 6090: Griffithii; 6114: Hemsleyana; 6149; Curtisii; 6186: Burkilliana; 6192: Griffithii; 6196: Dyeriana; 6202: setosa; 6208, 6233: Koordersiana; 6254: pseudoformosa; 6262: caudata; 6267: grata; 6268: Duthieana; 6385: Koordersiana; 6404: Dyeriana; 6462: cerina; 6555: inophylla; 6581: polyantha; 6584: Prainiana; 6600: leptostemon; 6601: setosa; 6611: cerina; 6614: polyantha; 6627: pseudosubtilis; 6665, 6682: leptostemon; 6708: filiformis var. clavimyrtus; 6743: longiflora; 6758: pustulata; 6759: napiformis; 6765: chlorantha; 6767: Dyeriana; 6793: setosa; 6822: Dyeriana; 6930: polita; 6937: cerina; 6946: pseudosubtilis; 6965: rugosa; 6974: garcinifolia; 6997: Dyeriana; 7003: valdevenosa; 7055: cerasiformis; 7065: densiflora; 7216: spicata; 7306: Benjamina;

7307: chloroleuca; 7315: polyantha; 7440: claviflora var. excavata; 7470, 7511: chlorantha; 7536: pustulata; 7563: Gageana; 7590: Swettenhamiana; 7669: Dyeriana; 7801: Scortechinii; 7811: Dyeriana; 7886: tumida; 7907: subdecussata; 7980: linocieroidea; 8030: subdecussata var. montana; 8094: linocieroidea; 8099: polyantha; 8102: densiflora; 8118: subdecussata; 8129: pseudosubtilis; 8200: scalarinervis; 8379: taipingensis; 8387: pseudomollis; 8409: subdecussata; 8475: papillosa; 8481: inophylla; 8535: chlorantha; 8549: longiflora; 8609: fastigiata; 8633: polyantha; 8679: polita; 8697: Hemsleyana; 8700: microcalyx; 8741: Goodenovii; 8755: longiflora; 8848: oblongifolia; 10042: Griffithii; 10076: Scortechinii; 10086: polyantha; 10246: valdevenosa; 10417: pseudosubtilis; 10437: Scortechinii; 10472: fastigiata; 10521: castanea; 10648: polyantha; 10677: leptostemon; 10735: pseudosubtilis; 10752: subdecussata; 10780: leptostemon; 10873: valdevenosa; 10883: oblongifolia; 10940: densiflora; 10995: tumida.

KURZ—2933: spicata.

LAKE & KELSALL—4076: claviflora var. montana; 4078: polita.

MAINGAY (Kew Distribution numbers ("K.D.") are given, as these are quoted in most works in preference to the collector's own numbers. The same K.D. number was sometimes given to more than one collection and therefore occasionally to more than one species. In such cases Maingay's own numbers are added)—718: spicata; 719: Muelleri (*Maingay 1410 & 1411*); 720: longiflora; 721: filiformis; 722: syzygioides; 723: grandis (*Maingay 1682*); 723: valdevenosa (*Maingay 1682a*); 724: syzygioides (*Maingay 1412a & 1412b*); 725: palembanica; 727: microcalyx; 728: polyantha; 729: Ridleyi; 730: grandis (*Maingay 1416a & 1416b*); 731: microcalyx (*Maingay 1235 & 3058*); 732: grandis; 733: chlorantha; 736: Scortechinii; 737: papillosa; 739: pseudocrenulata; 740: subdecussata; 741: Muelleri; 742: pachyphylla; 743: virens; 744: attenuata; 745: conglomerata; 746: oblongifolia; 747: pendens; 749: subdecussata; 750: claviflora var. Maingayi; 751: pustulata; 753: anisosepala (*Maingay 1558*); 753: laevicaulis (*Maingay 3012*); 754: Griffithii; 755: tumida; 757: grandis; 758, 760: densiflora; 762: valdevenosa; 770: fastigiata.

MURTON—98: claviflora; 105: pseudosubtilis.

RIDLEY—1: longiflora; 5: javanica; 19: longiflora; 89: spicata; 95: grandis; 134: spicata; 161: grandis; 256: polyantha; 267: spicata; 282: grandis; 291, 334: spicata; 339: polyantha; 348: tetraptera var. pseudotetraptera; 354: javanica; 360: oblongifolia; 386: densiflora; 848: polyantha; 1019: claviflora var. leptalea; 1021: rugosa; 1033: grandis; 1109: claviflora var. leptalea; 1290: spicata; 1301: oblata; 1469: spicata; 1503c, 1505c: oblongifolia; 2054: microcalyx; 2634: Hemsleyana; 2646: densiflora var. angustifolia; 2647: salictoides; 2991: caudata; 3086: glauca; 3095: scalarinervis; 3101: grata; 3108: glauca var. pseudoglauca; 3298: attenuata var. ophirensis; 3299: jasminifolia; 3524: palembanica; 3531: microcalyx; 3633a: oleina; 3706: Ridleyi; 3798: longiflora; 3839: Cumingiana; 3864: Duthieana; 3865: Cumingiana; 3881, 3899: tumida; 3902: pseudosubtilis; 3983: cerina; 3983*bis*: cerina var. turbinata; 4196: Muelleri; 4197: tetraptera var. pseudotetraptera; 4200: pauper; 4569: filiformis; 4570: tumida; 4571: syzygioides; 4572: oleina; 4579: tumida; 4580: spicata; 4588: Griffithii; 4657: pustulata; 4657: palembanica; 4659: pustulata; 4660: filiformis var. clavimyrtus; 4661: chlorantha; 4662: subdecussata; 4663: palembanica; 4664: polyantha; 4665: tumida; 4814: subdecussata; 4971: filiformis var. clavimyrtus; 4971a: filiformis; 4971b: filiformis var. clavimyrtus; 4972, 4972a, 4972b, 4972c: palembanica; 4973: pustulata; 4976: spicata; 4976: densiflora; 4976a: spicata; 4979: pustulata; 4980: Duthieana; 4981: Griffithii; 4982: Duthieana; 4983, 4984: syzygioides; 4985: oleina; 4986: Muelleri; 4988, 4989: cerina var. turbinata; 4990: pseudosubtilis; 4991: syzygioides; 4992: tumida; 4993: oblongifolia; 4995: tumida; 4996, 4997: syzygioides; 4998: longiflora; 4999: Cumingiana; 5001: oleina; 5073: conglomerata; 5090: javanica; 5208: polita; 5210: subdecussata var. montana; 5344: caudata; 5347: valdevenosa; 5348: javanica; 5728: Ridleyi; 5754: longiflora; 5755: microcalyx; 5842: papillosa; 5892: tumida; 5920: grandis; 5983: spicata; 5985: Muelleri; 5986: syzygioides; 6055: spicata; 6216: tumida; 6232: pseudocrenulata; 6233: Ridleyi; 6234: tumida; 6307, 6308: palembanica; 6416: Ridleyi; 6418: Kunstleri; 6419: Ridleyi; 6420, 6421: pustulata; 6422: microcalyx; 6527: cerina var. turbinata; 6540, 6802, 6802a: cerina; 6803, 6807: polyantha; 6915, 6915a: pauper; 6938: tumida; 6970: claviflora var. excavata; 7089: claviflora; 7313: porphyranthera; 7336, 7337: leptostemon; 7340: tumida; 7385: densiflora; 7951: Griffithii; 7953:

syzygioides; 7954: claviflora; 7955: grata; 7956: pseudosubtilis; 7957: chlorantha; 8048: pendens; 8104: tumida; 8376: auriculata; 8384: claviflora; 8386: glauca var. pseudoglauca; 8388: operculata; 8393: claviflora; 8400: Duthieana; 8411, 8412: pauper; 8424: oleina; 8445: palembanica; 8447: pendens; 8449: pauper; 8617: Bernardi; 8944: pauper; 8987: tetraptera; 9098: pseudosubtilis; 9181: chlorantha; 9213: tumida; 9222: chlorantha; 9378, 9378a: oblata; 9456: grata; 9486: leucoxylon; 9498: subdecussata; 9520: pseudoformosa; 9640: filiformis; 9668: Hoseana; 9845: tumida; 9847: pustulata; 9848: Ridleyi; 10059: attenuata var. ophirensis; 10131: oblongifolia; 10180, 10190: chlorantha; 10242: valdevenosa; 10290: grata; 10308: syzygioides; 10357: Cumingiana; 10366: pachyphylla; 10385: spicata; 10387: polyantha; 10389: subdecussata; 10395: longiflora; 10410: microcalyx var. irregularis; 10453: Cumini; 10720: Muelleri; 10781: pergamentacea; 10792: Cumingiana; 10799: Griffithii; 10805: polyantha; 10836: conglomerata; 10919: cerina; 10925, 10938: polyantha; 10947: spicata; 11054: attenuata; 11055: avenis; 11094, 11100: spicata; 11245: claviflora; 11258: papillosa; 11259: Duthieana; 11273: pseudoformosa; 11286, 11288: longiflora; 11289: palembanica; 11318: syzygioides; 11324: leptostemon; 11326: polyantha; 11365: tumida; 11381: polyantha; 11452: javanica; 11455: Cumini; 11485: chlorantha; 11489: spicata; 11847: oleina; 11920: chloroleuca; 11950: grata; 11989: Hoseana; 11992: pauper; 12010: tumida; 12104: Stapfiana; 12175: pauper; 12195: oleina; 12477: polyantha; 12482: microcalyx var. irregularis; 12562: Duthieana; 12669: polyantha; 12783: oblata; 13005: pustulata; 13019: subdecussata; 13020: tumida; 13219: pauper; 13252: virens; 13345: tetraptera; 13659: cerasiformis; 13901: pseudosubtilis var. montana; 14103: densiflora; 14136: pauper; 14136: pendens; 14137: palembanica; 14189: Ridleyi; 14628: pergamentacea; 14629: pseudoformosa; 14690, 14690a: densiflora var. angustifolia; 14691: Hemsleyana; 14729: syzygioides; 15060: oblata; 15061: pseudosubtilis; 15062: longiflora; 15063: polyantha; 15064: claviflora; 15065: claviflora var. leptalea; 15089: grandis; 15355: Muelleri; 15373: Scortechinii; 15374: cerina var. turbinata; 15401: fastigiata; 15402: javanica; 15411: Muelleri; 15448: laevicaulis; 15591: caudata; 15599: rugosa var. cordata; 15619: valdevenosa; 15773: grata; 15807: longiflora; 16015: pahangensis; 16022: clypeolata;

16031: viridescens; 16032: tahanensis; 16266: tekuensis; 16273: claviflora var. montana; 16274: cyrtophylloides; 16275: viridescens; 16306: Wrayi; 16396: salictoides.

Ridley's Collector—2054a: microcalyx; 4973: variolosa; 5823: chlorantha; 6801: longiflora; 6804: pustulata; 6805: Ridleyi; 6806: pustulata; 8111: tumida.

Ridley & Curtis—7952: chlorantha.

Ridley & Goodenough—1649: cerina.

Rubber Research Institute—22: grandis.

Scortechini—27: leptostemon; 45: chloroleuca; 83, 85: tumida; 99, 99a: leptostemon; 103: leucoxylon; 132: attenuata; 137: leucoxylon; 149: densiflora; 161: chlorantha; 163: Hoseana; 184: napiformis; 185: perakensis; 188: Muelleri; 203: nigricans; 205, 205a: Dyeriana; 216: ? inophylla; 234, 239: polyantha; 246: tumida; 257: Koordersiana; 294: subdecussata var. montana; 306: operculata; 313, 315: valdevenosa; 326: Bernardi; 336: Stapfiana; 337: myriantha; 349: spicata; 392: caudata; 409: oreophila; 444: caudata; 485: polita; 618: oblongifolia; 649: Scortechinii; 743: densiflora; 957: leucoxylon; 1209: polyantha; 1640, 1643: spicata; 1662: valdevenosa; 1768: fastigiata; 1884: valdevenosa; 2018: ? atronervia; 2021: virens; 2066: subdecussata.

Seimund—105: grandis; 357: rugosa var. saxitana; 358: Wrayi; 446: Hemsleyana; 927: claviflora var. riparia.

Singapore Field Number (SFN)—809: chlorantha; 830: longiflora; 912: grandis; 939: pauper; 940: densiflora; 1043: ? tiumanensis; 1217: syzygioides; 1408: tumida; 1425: filiformis; 2467: valdevenosa; 2653: caudata; 3017: fastigiata; 3042: pendens; 3222: Ridleyi; 3449: polyantha; 3783: chlorantha; 4448: syzygioides; 4474: spicata; 4481: pauper; 4560: claviflora var. excavata; 4976: jasminifolia; 5154: oblata; 5172: Duthieana; 5974: ? Scortechinii; 5982: pustulata; 6418: filiformis; 7515: claviflora; 7615: Muelleri; 7616: cerina var. turbinata; 7777: leptostemon; 7811: valdevenosa; 7936: pahangensis; 8088: Hemsleyana; 8099: densiflora var. angustifolia; 8535: ? palembanica; 8677: nitidula; 8685: subdecussata var. montana; 8803: Dyeriana; 8870, 8899: oreophila; 9037: leptostemon; 9107: Cumingiana; 10014: densiflora; 10036: attenuata; 10162: Graeme-Andersoniae; 10168: densiflora var. angustifolia; 10722: orites; 10747: subdecussata var. montana; 10790: spicata var. tenuiramis; 10820: ? jasminifolia; 10879: claviflora var. Maingayi; 11032:

Dyeriana; 11211: rugosa var. cordata; 11213: alyxifolia; 11264: cerina var. montana; 11456: goniocalyx; 11775: jasminifolia; 11828: nigricans; 11866: polyantha; 11993: jasminifolia; 12030: Graeme-Andersoniae; 12685: diospyrifolia; 12759: Duthieana; 12768: caudata; 12860: Griffithii; 13047: oblata; 13050: pseudosubtilis; 13121: longiflora; 13151: spicata; 13324: Cumini; 14041: Duthieana; 14271: polyantha; 14335: inophylla; 14849: attenuata; 14876: subdecussata var. montana; 14924: filiformis; 15098: grata; 15159: claviflora; 15160: spicata; 15348: grata; 15544: syzygioides; 16352: rugosa; 16650: inophylla; 17113: spicata; 18039: nitidula; 18050: tetraptera var. pseudotetraptera; 18052: Dyeriana; 18566: pendens; 18779: Symingtoniana; 19629: densiflora var. angustifolia; 19801: operculata; 19979: pseudoformosa; 20002: leptostemon; 20005: pauper; 20074: Bernardi; 20086: Hemsleyana; 20546: salictoides; 20665: pahangensis; 21068: tecta; 21803: operculata; 21196: Muelleri; 21315: papillosa; 21336: pseudosubtilis; 21401: syzygioides; 21405: Helferi, 21432: chlorantha; 21438, 21468, 21496: laevicaulis; 21548: oreophila; 21779, 21881: cerasiformis; 21887: Dyeriana; 22149: densiflora var. angustifolia; 22215: Dyeriana; 22355, 22476: cerasiformis; 22596: Graeme-Andersoniae; 22605: densiflora var. angustifolia; 23559: attenuata var. montana; 23586: Wrayi; 23603: Dyeriana; 23825: Muelleri; 23897: cerina var. turbinata; 23908: Bernardi; 23977: densiflora var. angustifolia; 24110: Curtisii; 24114: cerina var. turbinata; 24124: spicata; 24139: Muelleri; 24448: cerina var. turbinata; 24549: Dyeriana; 24596: longiflora; 24635: pendens; 24750: Dyeriana; 24812: inophylla; 24929: spicata; 24973: Cumingiana; 25756, 25914: densiflora; 25925: densiflora var. angustifolia; 25923: oblata; 26042: Muelleri; 26190: rugosa; 26869: Kunstleri; 27096: pterophorum; 28073: densiflora; 28078: pachyphylla; 28081: oleina; 28090: pseudocrenulata; 28144: leptostemon; 28327: valdevenosa; 28465: densiflora; 28497, 28522: nigricans; 28546: cerina; 28549: palembanica; 28557: leucoxylon; 28561: spicata; 28583: pseudosubtilis; 28622: Curtisii; 28637: longiflora; 28746: pseudosubtilis; 28806: pseudoformosa; 28846: Stapfiana; 28907: ? orites; 28977: castanea; 28978: pauper; 28979: leptostemon; 29046: attenuata; 29049: cerina; 29225: virens; 29228: syzygioides; 29249: castanea; 29301: Kunstleri; 29312: longiflora; 29328: atronervia; 29358: Ridleyi; 29368: conglomerata var. paniculata; 29400: Kiahii; 29487: syzygioides; 29488:

Cumini; 29489: syzygioides; 29495: microcalyx var. irregularis; 29703: densiflora var. angustifolia; 29727: inophylla; 29765: subdecussata; 29769: polita; 29857: claviflora; 29935: pseudosubtilis; 29941: subdecussata; 29966: Muelleri; 29975: palembanica; 29976: Griffithii; 30176: napiformis; 30322: Kunstleri; 30352: kemamanensis; 30420: Kunstleri; 30421, 30451: pseudosyzygioides; 30456: pseudocrenulata; 30481: ? flosculifera; 30492: Kunstleri; 30497: pseudosyzygioides; 30599: pseudoformosa; 30697: pauper; 30755: syzygioides; 30765: pachyphylla; 30900: longiflora; 30986: quadribracteata; 30995, 30996: microcalyx var. irregularis; 31080: Stapfiana; 31236: Cumingiana; 31256: attenuata var. montana; 31257: Cumingiana; 31258: pseudosubtilis var. montana; 31259: filiformis var. clavimyrtus; 31288: goniocalyx; 31435: valdevenosa; 31469: garcinifolia; 31474: valdevenosa; 31487: tumida; 31512: pseudosubtilis; 31536: Cumini; 31537: pseudosubtilis; 31575: Helferi; 31651: leucoxylon; 31660: grata; 31670: pseudosubtilis; 31710: tekuensis; 31711: Hemsleyana; 31755: pseudoclaviflora; 31782: Dyeriana; 31883: cerina var. montana; 31925: claviflora var. excavata; 31940: claviflora var. Maingayi; 32018: tetraptera var. pseudotetraptera; 32036: Kiahii; 32096: pseudosubtilis; 32132: napiformis; 32152: Ngadimaniana; 32217: spicata var. tenuiramis; 32219: Pearsoniana; 32220: palembanica; 32232: glauca var. pseudoglauca; 32254: oleina; 32328: papillosa; 32369: valdevenosa; 32392: polyantha; 32409: grata; 32413: polyantha var. sessilis; 32444: Muelleri; 32484: chlorantha; 32492: valdevenosa; 32529: pauper; 32595: attenuata var. montana; 32666: Curtisii var. Holttumii; 32712: filiformis var. clavimyrtus; 32734: pseudosubtilis var. montana; 32742: pachyphylla; 32794: palembanica; 32829: Dyeriana; 32950: ? napiformis; 33151: valdevenosa; 33160: caudata; 33202: pahangensis var. Fraseri; 33207: polita; 33208: cerian var. montana; 33265: syzygioides; 33425: pseudosubtilis; 33427, 33439: pachyphylla; 33563: glauca; 33590: nemestrina; 33661: Scortechinii var. cuneata; 33750: ? Symingtoniana; 33894: densiflora; 33903: ? nigricans; 33914: claviflora var. montana; 34068: setosa; 34075: attenuata; 34137: spicata; 34138, 34451: oblata; 34467: chlorantha; 34475: oblata; 34481: perakensis; 34545: palembanica; 34605: rugosa; 34680: attenuata; 34707: ? tumida; 34774: subdecussata; 34775: linocieroidea; 34777: attenuata; 34778, 34779: rugosa; 34780: glauca;

34781: cerina; 34786: filiformis; 34787: Duthieana; 34788: cerina; 34789: glauca; 34797: palembanica; 34924: longiflora; 34927: pseudosubtilis; 34937: leptostemon; 34954: glauca; 34958: attenuata; 34980: subdecussata; 34982: linocieroidea; 34986: chlorantha; 34988: nigricans; 34994: leptostemon; 35038: cerasiformis; 35056: pergamentacea; 35079: leptostemon; 35080: polyantha; 35183: siamensis; 35207: diospyrifolia; 35258: fastigiata; 35264: siamensis; 35266: longiflora; 35321: Helferi; 35347: chlorantha; 35357: rhamphiphylla; 35431: Millsii; 35759: chlorantha; 35761, 35776, 35777: pseudosubtilis; 35798: rugosa; 35876: oblata; 35888: chlorantha; 35915: ? napiformis; 35917: chlorantha; 35924, 35925: densiflora; 35928: pseudosubtilis; 35929, 35930: rugosa; 35932: Duthieana; 35933: rugosa; 35934: pseudosubtilis; 35936: densiflora; 35941, 35945, 35946: glauca; 35977: tumida; 36009: spicata; 36098: Kunstleri; 36115: attenuata; 36116: linocieroidea; 36128: nigricans; 36129: Ngadimaniana; 36133: flosculifera; 36171: Cumingiana; 36180: glauca; 36182: palembanica; 36190: rugosa; 36192: filiformis; 36200: rugosa; 36257: claviflora; 36258: longiflora; 36265: Cumingiana; 36275: tumida; 36279: pustulata; 36281: napiformis; 36291, 36293: virens; 36348: oblata; 36349: operculata; 36354: cerina; 36358: longiflora; 36381: attenuata; 36385: subdecussata; 36399: Ridleyi; 36403, 36404, 36409, 36412: rugosa; 36423: palembanica; 36429, 36436: pseudosubtilis; 36440: attenuata; 36448: Ridleyi; 36452: pseudosubtilis; 36530: microcalyx var. irregularis; 36531: nigricans; 36639: cerina; 36668: Kiahii var. angustifolia; 36754: Brantiana; 36790: cerina; 36805: oblata; 36824: Cumingiana; 36836: subdecussata; 36882: valdevenosa; 36920: Kunstleri; 36921: Kiahii var. angustifolia; 36956: Brantiana; 36959: oleina; 37012: Ngadimaniana; 37015: nigricans; 37018, 37019: Ridleyi; 37020: Ngadimaniana; 37086: ? tumida; 37096: Dyeriana; 37227: tumida; 37252: nemestrina; 37259: papillosa; 37368: oreophila; 37384: grandis; 37396: nemestrina; 37451, 37677: Helferi; 37725: Kunstleri; 37727: Cumingiana.

TERUYA—3021: spicata.

TEYSMANN—3307: tetraptera; 3603: puncticulata.

THOMSON—25: spicata.

THWAITES—160: calophyllifolia.

WALKER—34: spicata; 38: Muelleri; 98, 150: palembanica.

Wallich—3370: filiformis; 3567: cerasiformis; 3569: oblata; 3571: oleina; 3572, 3572b, 3573, 3574, 3575: claviflora; 3576: pseudosubtilis; 3578: filiformis; 3579: leucoxylon; 3580: filiformis; 3583: cerina; 3584: tumida; 3585: Muelleri; 3587: valdevenosa; 3588: Cumingiana; 3589: subdecussata; 3593: syzygioides; 3594: avenis; 3600: inophylla; 3600d: laevicaulis; 3618: palembanica; 3626: polita.

Woodford—6417: longiflora.

Wray—194: Curtisii var. minor; 216: Stapfiana; 217: subdecussata var. montana; 415: ? palembanica; 472: caudata; 479: plumbea; 544: densiflora; 544: densiflora var. augustifolia; 818: spicata; 966: cerasiformis; 1075: rugosa; 1125: cerina var. montana; 1127: cerasiformis; 1176: caudata; 1192: filiformis var. clavimyrtus; 1377: inophylla; 1403: tumida; 1504: Wrayi; 1514: caudata; 1582, 1619: Stapfiana; 1781: leptostemon; 1803: Hemsleyana; 1809: pseudoformosa; 1898: linocieroidea; 1938: cerasiformis; 1954: ? Burkilliana; 1973: longiflora; 2094: Dyeriana; 2097, 2118: subhorizontalis; 2209: valdevenosa; 2221: nigricans; 2241: longiflora; 2347: cerasiformis; 2372: pseudomollis; 2423: leptostemon; 2554: inophylla; 2587: polyantha; 2595: linocieroidea; 2609: leptostemon; 2632: Benjamina; 2655: inophylla; 2703: taipingensis; 2704: setosa; 2713: Griffithii; 2725: operculata; 2734: inophylla; 2785: Burkilliana; 2797: Benjamina; 2822: polita; 2824: caudata; 2842: valdevenosa; 2878: polyantha; 2917: chloroleuca; 2928: leptostemon; 2952: Hoseana; 2958: polyantha; 2968: Curtisii; 3016: Muelleri; 3066: napiformis; 3070: Burkilliana; 3102: Curtisii; 3130a: polyantha; 3134: leptostemon; 3199: cerasiformis; 3204: Benjamina; 3208: caudata; 3248: leptostemon; 3262: filiformis; 3403: Griffithii; 3465: fastigiata; 3537: pendens; 3581: pseudoformosa; 3656: Griffithii; 3688: pseudoformosa; 3844: subdecussata var. montana; 3859: Wrayi; 3907, 3908, 3914: ? palembanica; 3972: cerina; 3990: Prainiana; 4114, 4115: nitidula; 4144, 4150, 4154: inasensis.

Wray & Robinson—5338: viridescens; 5454: pahangensis.

INDEX

New varieties, new names, new combinations in **bold-faced** type, synonyms in *italics*.

Acmena:
  acuminatissima (Bl.) Merr. & Perry, 10, 260.
Calyptranthus:
  caryophyllifolia Bl., 154, 156.
  caryophyllifolia Willd., 154.
  fastigiata Bl., 190.
  floribunda Bl., 190, 191.
  pyrifolia Bl., 161.
Caryophyllus:
  antisepticus Bl., 234.
  aromatica L., 270.
  fastigiatus Bl., 190.
  floribundus Bl., 190.
Clavimyrtus:
  glabrata Bl., 147, 148.
  virens Bl., 249, 251.
Cleistocalyx:
  operculata (Roxb.) Merr. & Perry, 264.

Decaspermum:
  montanum Ridl., 270.

Eugenia:
  acuminatissima Berg., 260.
  acuminatissima Kurz., 260.
    var. *parva* Merr., 150.
  acuminatissima Miq., 260.
  alata Ridl., 180.
  albidiramea Merr., 209, 210.
  alyxifolia Ridl., 215.
  anisosepala Duthie, **114,** 115.
  apiculata DC., 2, 3, 272.
  aquea Burm. f., 2, **53,** 75.
  aromatica Kuntze, 7, **270.**
  attenuata (Miq.) Koord. & Valet., 7, 174, **238,** 241, 246, 248, 252.
    var. **montana** var. nov., 242.
    var. **ophirensis** var. nov., 241.
  atronervia Henderson, 91.
  auriculata Ridl., 54.
  avenis (Miq.) comb. nov., **171,** 172.
  balsamea Ridl., 211.
  balsamea Wight, 211.
  bankensis (Hassk.) Backer, 227.
  Benjamina King, **152,** 154.
  Bernardi King, 138, **142.**
  borneensis Miq., 204.
  bracteata Roxb., 3, 272.
  bracteolata Wight, 190, 191.
  Brantiana Henderson, 145.
  brevistylis C. B. Rob., 237.
  brunneoramea Merr., 197.
  Burkilliana King, **116,** 118.
    var. **garcinifolioides** var. nov., 118.
  camptophylla Henderson, 140.
  carissoides Muell., 272.
  caryophyllata Thunb., 270.
  castanea Merr., 156.
  caudata King, **148,** 150, 241.
  cauliflora Berg., 48.
  cauliflora DC., 48.
  cauliflora Miq., 48.
  cauliflora Ridl., 48.
  cerasiformis (Bl.) DC., **196,** 198.
  cerina Henderson, 7, **168,** 170, 172.
    var. **montana** var. nov., 171.
    var. **turbinata** var. nov., 170.
  chlorantha Duthie, **107,** 108.
  chloroleuca King, 189.
  ciliaris Ridl., 270.
  cinerea Kurz, 202, 204.
  cinerea Ridl., 202.
  Clarkeana King, 126, 128.
  clavata (Korth.) Merr., 252.
  claviflora Roxb., 7, 8, 10, 14, **252,** 255, 262.
    var. excavata King, 257.
    var. *glandulosa* King, 257.
    var. **leptalea** (Craib) var. nov., 255.
    var. *leptantha* King, 255.
    var. Maingayi King, 257, 260.
    var. **montana** var. nov., 260.
    var. **riparia** var. nov., 257.
  clavimyrtus Koord. & Valet., 147, 148
    var. *minor* Koord. & Valet., 145.
  clypeolata Ridl., 227.
  colorata Duthie, 95.
  confertiflora Koord. & Valet., 190, 191.
  conglomerata Duthie, 7, **198.**
    var. **paniculata** var. nov., 201.
  corallina Merr., 174.
  cordata Laws., 272.
  cordifoliata Ridl., **95,** 124.
  corrugata King, 126, 128.
  costaricensis Berg., 272.
  crenulata Duthie, 216.
  crenulata Willd., 216.
  Cumingiana Vidal, 10, 14, **260,** 262.
  Cumini (L.) Druce, 182.
  cuprea Koord. & Valet., 234.

Eugenia:
  Curtisii King, **174,** 176.
    var. **Holttumii** (Ridl.) var. nov., **176,** 178.
    var. minor King, **175,** 178.
  cyanocarpa Muell., 272.
  cymosa Lamk., 154, 155, 156.
  cymosa Wight, 154.
    var. *concinna* King, 156.
  cyrtophylloides Ridl., 167.
  "*densiflora* Bl.", 78.
  densiflora (Bl.) Miq., 73, **78,** 133, 138.
    var. angustifolia Ridl., **79,** 82, 93.
  diospyrifolia Duthie, **67,** 70, 71.
    var. lanceolata (Korth.) Craib, 69.
  diospyrifolia Wall., 67.
  dolichophylla Kiaersk., 50.
  dolichophylla Koord. & Valet., 50.
  "*doligophylla*" Koord. & Valet., 50.
  Dombeyana DC., 272.
  Duthieana King, **118,** 121.
  Dyeriana King, 92, **126,** 128, 130.
    var. *oblonga* King, 126.
  Elmeri Merr., 190, 191.
  euneura Craib, 197.
  Evansii Ridl., 197.
  expansa Duthie, 196.
  fastigiata (Bl.) Koord. & Valet., **190,** 191.
  filiformis Duthie, **145,** 147, 251, 262.
    var. **clavimyrtus** (Koord. & Valet.) var. nov., 147.
    var. *parvifolia* Craib, 148.
  filiformis Macfady., 148.
  flosculifera Henderson, 7, **237.**
  formosa King, 69.
  formosa Koord. & Valet., 70.
  formosa Wall., 69.
  Foxworthyi Elmer, 79.
  Foxworthyi Ridl., 79.
  Foxworthiana Ridl., 79.
  Fraseri Ridl., 253.
  fusiformis Duthie, 249.
  fusticulifera Ridl., **246,** 248, 249.
  Gageana King, 133.
  garcinifolia King, **83,** 118.
  glabrata Berg., 147.
  glabrata DC., 147.
  glauca King, 112.
    var. pseudoglauca King, 113.
  glaucicalyx Merr., 233, 234.
  Goodenovii King, 244.
  Goodenovii King, **emend.,** 172.
  goniocalyx Ridl., 165.
  Graeme-Andersoniae Ridl., 111.
  grandis Wight, 2, **87,** 270.
  grandis var. *lepidocarpa* Kurz, 86.
  grata Wight, **233,** 234.
  Griffithii King, 115, **120,** 121, 123.
  Haniffii Henderson, 139.
  Helferi Duthie, 108, **109.**
  Hemsleyana King, 92, **129,** 130, 132.
  Holttumii Ridl., 176.
  Hoseana King, 103.
  Hullettiana King, 107, 108.
  inasensis King, **100,** 102.
  incarnata Elm., 168, 169, 170.
  inophylla (DC.) Roxb., 138, **141,** 142, 144, 145.
    var. *Bernardi* (King) Ridl., 142.
  irregularis Craib, 207.
  jambolana Lamk., 182.
  jamboloides Koord. & Valet., 196, 198
  Jambos Linn., 61, **62.**
  jasminifolia Ridl., **223,** 225, 226.
  javanica Lamk., 2, **74,**
  javensis Koord. & Valet., 197, 198.
  johorensis Ridl., **73,** 244.
  johorensis Ridl., 244.
  jugalis Ridl., 61.
  Junghuhniana Miq., 211.
  kemamanensis Henderson, 93.
  Kiahii Henderson, 115.
    var. **angustifolia** var. nov., 116.
  kinabaluensis Stapf, 230.
  Klossii Ridl., 179.
  Koordersiana King, **212,** 214.
  Kunstleri King, **209,** 211.
  laevicaulis Duthie, 115, **138.**
  lanceolata Lamk., 255.
  laxiflora Koord. & Valet., 197.
  laxiuscula Ridl., 136, 137, 138.
  lepidocarpa Kurz, 85.
  leptalea Craib, 255.
  leptantha Benth., 255.
  leptantha Wight, 255.
  leptogyna C. B. Rob., 249
  leptostemon (Korth.) Miq., 201.
  leucoxylon (Korth.) Miq., 235.
  limnoea Ridl., 136, 137, 138.
    var. *gracilior* Craib, 136.
  lineata DC., 159.
  lineata Duthie, 159, 198.
  linocieroidea King, **163,** 166.
  longicalyx Ridl., 159.
  longicauda Ridl., 232.
  longiflora (Presl) F. Vill., **159,** 161, 165, 198.
  Luehmanni Muell., 273.
  Maingayi Duthie, 257.
  malaccensis Linn., 2, 4, **46,** 75.
  malayana Gagnep., 50.
  marivelesensis Merr., 159.
  Michelii Lamk., 3, 7, 273.
  microcalyx Corner, 207.
  microcalyx Duthie, 204, **205.**
    var. **irregularis** (Craib) var. nov., 204, **207.**
    var. *obovata* King, 205.
  Millsii Henderson, 92.
  Miquelii Elm., 159.
  mollis King, 75.
  mollis Willd., 75.

Eugenia:
- *Motleyi* Ridl., 244.
- Muelleri Miq., 3, **186,** 187 .
- myriantha King, 209.
- myrtifolia Cambess., 150.
- myrtifolia *non* Roxb., 3.
- *myrtifolia* Roxb., 150, 151.
- myrtifolia Salisb., 150.
- myrtifolia Sims, 150.
- napiformis Koord. & Valet., 241, **247,** 248, 249.
- nemestrina Henderson, 192.
- *nemoricola* Ridl., 67.
- Ngadimaniana Henderson, 108.
- nigricans King, 194.
- *nitida* Duthie, 211.
- *nitidissima* Merr., 232.
- nitidula Ridl., **226,** 230.
- oblata Roxb., **136,** 137, 138, 139, 140, 141, 142, 179.
- oblongifolia Duthie, 138, **184.**
  - var. *parvifolia* King, 184.
  - var. *robusta* King, 138, 141, 142, 184.
- oleina Wight, **150,** 194.
- operculata Roxb., 10, **264.**
- oreophila Ridl., 61.
- orites Ridl., 214.
- pachyphylla Kurz, 90.
- pahangensis Ridl., **101,** 102.
  - var. **Fraseri** var. nov., 101, **102.**
- palembanica (Miq.) Merr., **85,** 270.
- pallidula Ridl., 192.
- papillosa Duthie, 77.
- *parva* C. B. Rob., 150, 151.
- pauper Ridl., 178.
- Pearsoniana King, **134,** 136.
- *penangiana* Duthie, 238, 241.
- pendens Duthie, **71,** 180.
- perakensis King, **51,** 55, 57.
- pergamentacea King, 92, **130.**
- *perpuncticulata* Merr., 188, 189.
- plumbea King, **63,** 66.
- polita King, **221,** 225, 226.
- polyantha Wight, 7, **211.**
  - var. **sessilis** var. nov., 212.
- porphyranthera Ridl., **59,** 66.
- praestigiosa Henderson, 158.
- Prainiana King, **133,** 136.
  - var. *Pearsoniana* (King) Ridl., 134.
- pseudoclaviflora Henderson, 252.
- **pseudocrenulata** nom. nov., 216.
- pseudoformosa King, 67, **69,** 70, 71.
- *pseudoglauca* Ridl., 113.
- **pseudomollis** nom. nov., 75.
- pseudosubtilis King, 146, **202,** 204, 205, 209.
  - var. **montana** var. nov., 205.
  - var. *platyphylla* King, 202, 204, 205.
  - var. *subacuminata* King, 202, 205.
- pseudosyzygioides Henderson, **157,** 158.
- *pseudotetraptera* King, 220.
- puncticulata Miq., 169.
- punctulata F. M. Bailey, 168, 169.
- *punctulata* King, 168, 169.
- pustulata Duthie, **188,** 211.
- pyrifolia Desv., 161.
- *pyrifolia* (Bl.) Duthie, 161.
- quadrata King, 55.
- quadribracteata Henderson, 166.
- rhamphiphylla Craib, 241, **242,** 248, 262.
- *rhododendrifolia* Miq., 252.
  - forma *longifolia* Miq., 252.
- rhomboidea Ridl., 80.
- Ridleyi King, 123, **125.**
- rigida DC., 244.
- *Robinsoniana* Ridl., 197.
- Rostadonis Ridl., 65.
- *rotata* Craib, 201.
- *rubricaulis* (Miq.) Duthie, 159.
- rugosa (Korth.) Merr., 159, 174, 241, **244,** 246, 248, 249.
  - var. **cordata** var. nov., 246.
  - var. **saxitana** (Ridl.) var. nov., 246.
- *ruminata* Koord. & Valet., 253, 255.
- salictoides Ridl., 82.
- *saligna* C. B. Rob., 261.
- *saxitana* Ridl., 246.
- scalarinervis King, 57.
- *scoparia* Duthie, 171, 172.
- Scortechinii King, **66,** 69, 71.
  - var. **cuneata** var. nov., **67,** 70, 71.
  - var. *parvifolia* King, 66.
- selangorensis Ridl., **84,** 85.
- setosa King, 176.
- siamensis Craib, 59.
- *simulans* King, 142, 159.
- sinubanensis Elm., 150, 151.
- spicata Lamk, 230, **231,** 232, 233, 234
  - var. **tenuiramis** (Miq.) var. nov., 230, **232.**
- spissifolia Ridl., 235.
- Stapfiana King, 228.
- subdecussata Duthie, 2, **95,** 97, 101.
  - var. *colorata* King, 95.
  - var. montana King, 97.
- subhorizontalis King, 124.
- *subracemosa* Merr., 201.
- *subrufa* King, 120.
  - var. *robusta* King, 120.
- supra-axillaris Spring, 73.
- *Swettenhamiana* King, 95.
- Swettenhamiana King, **emend.,** 124.
- Symingtoniana Henderson, **267,** 270.
- **syzygioides** (Miq.) comb. nov., **154,** 157, 158.
- tahanensis Ridl., 102.
- taipingensis Henderson, 193.

Eugenia:
tecta King, 223, 225, 226.
tekuensis nom. nov., **48,** 51.
teretiflora Koord. & Valet., 255.
tetrahaedra Duthie, 270.
tetraptera (Miq.) comb. nov., **218,** 225, 226.
var. **pseudotetraptera** (King) var. nov., **220,** 221.
Teysmannii (Miq.) Koord. & Valet., 159.
Thumra Roxb., 123.
var. penangiana King, 121.
tiumanensis Ridl., **70,** 71.
trunciflora Berg., 49.
trunciflora G. Don, 48.
trunciflora Rich., 48.
trunciflora Ridl., 48.
tumida Duthie, **161,** 163.
uniflora L., 2.
urceolata Cordem., 201.
urceolata King, 201.
valdevenosa Duthie, 180.
Valetoniana King, 120.
variolosa King, 105.
venulosa Duthie, 186.
var. *macrothyrsa* King, 186.
verecunda Duthie, 235.
var. *major* Ridl., 235.
virens (Bl.) Koord. & Valet., 73, **249.**
viridescens Ridl., 97.
viridifolia Elm., 253.
Watsoniana Henderson, 268.
Wightiana Wight, 255.
Wrayi King, 98.
zeylanica Wight, 231.
zeylanica Willd., 231.
Zippeliana Koord. & Valet., 197, 198.

Jambosa:
attenuata Miq., 238.
borneensis Miq., 252.
cerasiformis Hassk., 198.
clavata Korth., 252.
confusa Bl., 50.
densiflora DC., 78.
glabrata DC., 147.
insignis Bl., 50.
Korthalsii Bl., 50.
lanceolata Korth., 50.
leptostemon Korth., 201.
lineata DC., 159.
puncticulata Miq., 169.
"punctulata" Miq., 169.
rubricaulis Miq., 159.
saligna Miq., 261, 262.
syzygioides Miq., 154, 156.
tenuiramis Miq., 232.
tetrahaedra Miq., 270.
tetraptera Miq., 218, 220.
Teysmannii Miq., 159.
urceolata Korth., 201.

Key to Species, 18.

Myrtus:
acuminatissima Bl., 260.
caudata Wall., 149.
cerasiformis Bl., 196, 198.
Cumini Linn., 182.
densiflora Bl., 78.
glabrata Bl., 147.
lineata Bl., 159.
lineata Sw., 159.
samarangensis Bl., 74.
zeylanica Linn., 231.

Syzygium:
albidirameum (Merr.) Merr. & Perry. 209.
antisepticum (Bl.) Merr. & Perry, 234.
apodum Miq., 97.
aqueum (Burm. f.) Alston, 53.
attenuatum (Miq.) Merr. & Perry, 238
avene Miq., 171, 172.
bankense (Hassk.) Merr. & Perry, 227.
campanulatum Korth., 152.
castaneum (Merr.) Merr. & Perry, 156.
cerasiforme (Bl.) Merr. & Perry, 196.
chloranthum (Duthie) Merr. & Perry, 107.
clavatum (Korth.) Merr. & Perry, 252.
claviflorum (Roxb.) Cowan & Cowan, 252.
concinnum Wall., 156.
confertum (Korth.) Merr. & Perry, 214.
Cumini (L.) Skeels, 182.
Curtisii (King) Merr. & Perry, 174.
euneuron Miq., 197,198.
fastigiatum (Bl.) Merr. & Perry, 190.
filiforme Wall., 145.
Foxworthianum (Ridl.) Merr. & Perry, 79.
fusiforme (Duthie) Merr. & Perry, 249.
fusticuliferum (Ridl.) Merr. & Perry, 246.
garcinifolium (King) Merr. & Perry, 83.
grande (Wight) Walp., 87.
Griffithii (Duthie) Merr. & Perry, 120

Syzygium:
Hoseanum (King) Merr. & Perry, 103.
incarnatum Merr. & Perry, 168.
inophyllum DC., 141.
irregulare (Craib) Merr. & Perry, 207.
Jambos (L.) Alston, 62.
javanicum Miq., 196.
leptanthum (Wight) Niedenz., 255.
leptostemon (Korth.) Merr. & Perry, 201.
leucoxylon Korth., 235, 237.
lineatum (DC.) Merr. & Perry, 159.
longiflorum Presl, 159, 161.
malaccense (L.) Merr. & Perry, 46.
minutiflorum Miq., 202.
Muelleri Miq., 186.
myrtifolium (Roxb.) DC., 150.
napiforme (K. & V.) Merr. & Perry, 247.
nigricans (King) Merr. & Perry, 194.
nigropunctatum Merr. & Perry, 172.
oblatum Wall., 136.
oleinum Wall., 151.
operculatum (Roxb.) Niedenz., 264.
pachyphyllum (Kurz) Merr. & Perry, 90.
palembanicum Miq., 85.
papillosum (Duthie) Merr. & Perry, 77.
perpuncticulatum (Merr.) Merr. & Perry, 188.
polyanthum (Wight) Walp., 211.
pseudoformosum (King) Merr. & Perry, 69.
pterophorum Merr. & Perry, 221.
punctulatum Wall., 169.
pycnanthum Merr. & Perry, 78.
pyrifolium (Bl.) DC., 161.
racemosum (Bl.) DC., 196.
rhamphiphyllum (Craib) C.E.C. Fischer, 242.
rigidum Wall., 174, 244.
rugosum Korth., 244.
samarangense (Bl.) Merr. & Perry, 74.
scoparium Wall., 171.
subdecussatum Wall., 95, 97.
syzygioides (Miq.) Merr. & Perry, 154.
urceolatum (Korth.) Merr. & Perry, 129, 130.
valdevenosum (Duthie) Merr. & Perry, 180.
venulosum Wall., 186.
verecundum Wall., 235.
viridifolium (Elmer) Merr. & Perry, 253.
zeylanicum (L.) DC., 231.

PUBLICATIONS OF THE BOTANIC GARDENS SINGAPORE

---

1. **The Agricultural Bulletin of the Malay Peninsula** (Old Series) nos. 1–9, 1891–1900 (out of print).
2. **The Agricultural Bulletin of the Straits and F.M.S.** (Second Series, monthly issues) Vols. 1–10, 1901–1911. Most numbers are available, price 50 cents each or $5 per volume.
3. **The Gardens Bulletin, Straits Settlements.**
   - Vol. 1 nos. 1–5, January to May 1912 (as *Agricultural Bulletin of the Straits and F.M.S., Third Series*); nos. 6–12, December 1913—March 1917 (as *The Gardens Bulletin, S.S.*).
   - Vol. 2 nos. 1–12, July 1918—August 1921.
   - Vol. 3 nos. 1–12, August 1923—March 1925.
   - Vol. 4 nos. 1–12, June 1926—January 1929.
   - Vol. 5 nos. 1–12, August 1929—June 1932.
   - Vol. 6 nos. 1–15, (issued as parts 1–3) December 1929—October 1930.
   - Vol. 7 parts 1–3, September 1932—June 1934.
   - Vol. 8 parts 1–4, October 1934—October 1935.
   - Vol. 9 parts 1–4, December 1935—March 1938.
   - Vol. 10 parts 1 and 2, January 1939—August, 1939.
   - Vol. 11 parts 1–3, May 1939—August 1941.
4. **The Gardens Bulletin, Singapore.**
   - Vol. 11 part 4, September 1947.

The above former issues of the Gardens Bulletin may be purchased from the Botanic Gardens, Singapore, at $5 per volume or 50 cents per number for vols. 1–5 (Vol. 6, of 15 numbers, $7.50); in some cases two or more numbers were published together. Vols. 7–11 are published at $8 per volume; the prices of parts vary according to their size. The parts are published at irregular intervals, as material is available.

Subscriptions per volume, payable in advance, $12.50 in Malaya, $13/- or $30/- outside Malaya.

18196—325—4/49